

Rural Health Status Report

Saskatoon Health Region



A Report of the Chief Medical Health Officer



Public Health Services

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Consultations with SHR rural managers and rural practitioners, public health service managers, and senior leadership team took place during the development of this report and valuable feedback has been gathered from this process.

Main Messages

The purpose of this report is to develop a better understanding of the health status of Saskatoon Health Region's (SHR's) rural residents and differences between the region's rural and urban residents. It sheds light on rural health needs in particular and will hopefully provide valuable insights to inform rural programs and policies.

For many important public health measures, rural SHR residents fared at least as well as, if not better than, urban residents using data from 1995 to 2006. For example, there were similarities in life expectancy, mortality, and infant health measures between urban and rural SHR residents. This is a good news story for rural SHR, though there were still areas where variations in health outcomes and income levels existed.

The relatively high proportion of seniors living in rural SHR has implications for health care services. Provision of community-based housing such as assisted living and personal care homes, long-term care and home care in particular are important for seniors.

While population projections show a continued decreasing trend for rural SHR, current economic prosperity and population in-migration into Saskatchewan may slow years of rural population decline.

Poverty exists in rural SHR, but it is not as concentrated geographically as in Saskatoon. First Nations Reserves are where poverty is comparable to the core neighbourhoods of Saskatoon. Providing health and social services to the rural poor will prove challenging because of the small numbers of affected residents spread over a large geographic area. However, every effort should be pursued to assist those in need.

Health behaviour measures are generally poorer in rural SHR residents compared to urban. Of particular concern is healthy eating, which is likely constrained in rural SHR because of the high costs of nutritious foods and limited availability. More detailed information on health behaviours among rural residents is needed to help tailor health interventions.

Higher hospitalization rates for rural residents is at least partially due to easier access to beds in rural SHR rather than any increased overall burden of disease. This could also be due to a lack of availability of other primary health services such as 24-hour access to a family physician or walk-in clinic. Limited numbers of community practitioners and services in rural SHR likely means that some people are hospitalized that would not be in the city where such alternatives exist.

Many types of enteric disease are centred in the south eastern parts of the health region. An in-depth look into the cause of these cases is warranted. Rural residents had higher coverage rates for immunizations which may have something to do with strong relationships between public health nurses and people in rural communities.

The findings of this report signal that in SHR, rural residence is not as negatively related to health as is reported nationally. Further analysis may be needed to understand how much of a factor rural residence is in explaining variations in health status in SHR.

Executive Summary

The impact of “place” on health, that is, where people live, work, and play, is an area of increasing attention in the population health field. Most studies to date have examined urban places or environments and their impact on health. More recently, the Canadian Population Health Initiative published a report on the health of rural populations.¹ While Saskatoon Health Region (SHR) has recently paid a great deal of attention to health disparities within Saskatoon’s urban neighbourhoods, it is important to recognize that health disparity is not unique to urban areas. The purpose of this report is to analyze the health status of SHR’s rural residents with a focus on whether gaps in health status exist between urban and rural residents and between subgroups in rural SHR.

The health status of SHR’s rural residents has rarely been subject to in-depth analysis. This report is the first of its kind to show a range of health status indicators specifically for those residents that live outside of Saskatoon. The main findings from each section of the report follow.

Population Demographics

One issue of paramount importance is the population decline in rural SHR that has occurred over the past number of years. Debate as to whether this decline has stopped or reversed due to recent population in-migration continues. While population projections predict a continued decline, a close watch on rural populations is justified given current economic prosperity in Saskatchewan, especially in those communities in close proximity to Saskatoon.

A high proportion of senior residents live in rural SHR. Planning for health services like long-term care, home care, mental health, physician and nurse practitioner services, amongst others, will be of critical importance for this population group. The high proportion of seniors impacts many of the health behaviour findings in this report. For example, people tend to smoke less in older age which helps explain the lower smoking rates in rural SHR compared to urban.

Birth rates have fallen in both urban and rural areas of SHR. Interestingly, birth rates tend to decrease in the most rural areas. The area that contains two of the four First Nations Reserves in SHR has maintained a steady birth rate. This is likely due to the fact that Aboriginal populations have higher birth rates than non-Aboriginals.²

Socio-economic Status

Much attention has been raised in recent years about poverty in urban Saskatoon while the degree and impact of poverty in rural SHR has largely been an unknown. We chose to examine poverty using three different criteria. We found that Saskatoon Census

¹ DesMeules M & Pong R. (2006). *How healthy are rural Canadians? An assessment of their health status and health determinants*. Ottawa: Canadian Population Health Initiative. Accessed May 28, 2008 from http://secure.cihi.ca/cihiweb/dispPage.jsp?cw_page=GR_1529_E.

² Neudorf C., Marko J., Wright J., Ugolini C., Kershaw T., Whitehead S., Opondo J., Findlater. (2009). *Health status report 2008: A report of the Chief Medical Health Officer*. Saskatoon: Saskatoon Health Region.

Metropolitan Area (CMA) residents had over 30% higher average annual income than residents from the rest of SHR. However, we also looked at the Low Income Cut Off (LICO)³, the most commonly used poverty line in Canada, and found that about 12% of rural residents lived below the LICO compared to over 16% of Saskatoon CMA residents. These messages are somewhat conflicting, though consistent with the literature, which shows that while rural residents may earn less income than their urban counterparts, fewer of them are in dire circumstances as demonstrated by the LICO. Finally, to help get a more comprehensive look at rural poverty we used findings from a deprivation index that showed pockets of poverty in rural SHR. Identifying local poverty can help focus health and social services to these areas of highest need.

Health Status Measures

For a number of health status measures, rural residents fared equally well, if not better, than residents in urban Saskatoon. Though these differences are not statistically significant, life expectancy at birth tended to be higher and infant mortality lower for rural residents than urban. Preterm birth rates and low birth weight percentage were both statistically significantly lower for rural SHR residents compared to urban. Lower teen pregnancy rates in rural SHR helps explain the better rural pregnancy outcomes seen. The fact that rural SHR residents have at least as good as, if not better, pregnancy outcomes and life expectancy than urban Saskatoon residents is contrary to much of the literature in this field. Canadian reports conclude that rural residents expect to live fewer years and have worse pregnancy outcomes.⁴

Mortality/Health Utilization

Rural SHR residents had lower all-cause mortality rates than their urban counterparts, which is a surprise because much of the literature points to higher death rates generally in rural areas. Age standardized death rates were examined for smaller geographic areas and areas around Rosthern had higher rates than the SHR average. There were lower death rates from cancer and respiratory causes in rural SHR. These findings again are contrary to what one finds in the literature. Death rates from heart disease and injury were higher in rural SHR, though not statistically different. Motor vehicle collision death rates were significantly higher in rural than urban areas, which is consistent with the literature.

Hospitalization rates were higher for rural SHR residents compared to urban residents with Wadena, Wynyard and Rosthern areas having the highest hospitalization rates. Higher hospitalization rates in rural areas may have more to do with the better availability of primary care, home care, or family supports and community-based therapies in urban areas. There may be instances of rural hospitalizations that would not result in hospitalizations in Saskatoon given the alternatives available including greater access to community programs and services, though this is outside the scope of this report.

Health Behaviours

³ The LICO is defined as the income threshold below which a family will likely devote a larger share of its income on the necessities of food, shelter and clothing than the average family. It is adjusted for family size, community size and given on a before and after-tax basis. Accessed October 18, 2009 from <http://www.statcan.gc.ca/pub/75f0002m/2009002/s2-eng.htm>.

⁴ Romanow R. (2002). *Building on values: The future of health care in Canada*. Saskatoon, SK: Commission on the future of health care in Canada. Accessed May 21, 2008 from http://www.hc-sc.gc.ca/hcs-sss/alt_formats/hpb-dgps/pdf/hhr/romanow-eng.pdf

Using data from the 2001 to 2005 combined Canadian Community Health Survey showed that the proportion of the population that were current smokers (daily and occasional) was higher for urban residents than for rural SHR residents. Other findings showed that rural SHR residents scored worse in physical activity, and vegetable and fruit consumption measures. For self-reported health, and overweight and obesity measures, rural residents also fared poorer, but the differences were not statistically significant. Rural residents did have a greater sense of community belonging than urban residents, something which is also found in Canadian literature.

Health Services

To determine the impact that availability of health services might have on rural health, we examined health provider/population ratios. We found a lower proportion of general practitioners that practice in rural SHR compared to urban. This finding is well known, not only in our province, but nationally. However, the number of nurse practitioner full-time equivalents working in rural SHR is almost the same as urban. Availability and accessibility of assessment and diagnostic services, therapies, and community-based supports are also issues in rural SHR, but these aspects are outside the scope of this report.

Communicable Diseases

Communicable diseases campylobacter and cryptosporidium, had slightly elevated rates in rural SHR. Most of these cases were in the eastern region and could be due to poultry processing or water quality issues in that part of our region. Although Saskatoon accounts for the greatest number of cases, West Nile virus rates are higher in rural SHR than Saskatoon.

Immunization coverage rates in rural exceeded Saskatoon rates, though past analysis suggests the areas surrounding Rosthern and First Nations Reserves need more concentrated efforts. Despite better coverage rates in rural SHR, we still fall short of meeting national standards for immunization rates.⁵ Sexually transmitted infection (STI) rates were much lower for residents outside Saskatoon.

Conclusion

Rural residents generally fared well when compared to urban residents for a number of health related indicators. Some of the findings are contrary to what we find in the literature and a more in-depth look as to why may be needed.

⁵ National standards for immunization coverage by two years of age is 95% for Pertussis and 97% for Rubella. Accessed October 18, 2009 from <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/08pdf/34s2-eng.pdf>

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Glossary

CA – Census Agglomeration

CCHS – Canadian Community Health Survey

CMA – Census Metropolitan Area (in this report Strong MIZ is also included in CMA)

CSD – Census Sub-Division

DA – Dissemination Area

LICO – Low Income Cut Off

MIZ – Metropolitan Influence Zone

RIS – Registered Indian Status

SHR – Saskatoon Health Region

Preface

The role of place and its impact on health is an area of increasing attention in the population health field. Most studies to date have examined urban environments, and more recently, the Canadian Population Health Initiative has directed attention to characterizing the health of rural populations.

This report is the first of its kind for the Saskatoon Health Region, as rural health status has never before been examined in detail which represents a gap in our knowledge about the state of health of our residents. The Saskatoon Public Health Observatory is pleased to have supported the Chief Medical Health Officer in developing this report. We know it will also become a useful complement to the 2008 Health Status Report which provides health status measures for the entire SHR. It will also inform the development of a SHR Rural Health Strategy, a key SHR goal for 2009/10.

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Introduction

Standing in a barren wheat field seemingly in the middle of nowhere, it is hard to fathom that nearly 300,000 people live in the Saskatoon Health Region (SHR). The reality is that almost three quarters of this population is concentrated in the City of Saskatoon, while the rest of the population is spread over a land area of 32,000 square kilometres.

As the region embarks on the development of a Rural Health Strategy, senior leaders and decision-makers, front line staff and rural residents themselves seek more information in order to better understand rural health needs. This report aims to assist health practitioners and decision-makers to be more aware of rural health status and the needs of rural residents in order to plan appropriate services now and in the years to come.

Rural health is particularly important in our province, as a higher proportion (40%) of our residents live in rural areas compared to 16% in the rest of Canada (Statistics Canada, 2003). Many sectors of our economy are rural-based like agriculture and mining, and the prairie regions have long been known as the bread basket to the world. With this in mind, we cannot overlook the importance of rural areas to all residents, whether one lives in a city or rural community.

Despite the importance of rural areas, populations in rural Saskatchewan and in most rural areas around the world are in decline. The Government of Saskatchewan reported that the decline in rural Saskatchewan has occurred for the past 50 years and that it could take 20 years or more to make rural growth a reality (Saskatchewan Government, 2002).

While access to rural health services has been the subject of much discussion and action in health care in recent years, less attention has been paid to the overall health status of rural populations. A national report (DesMeules & Pong, 2006) found rural residents had:

- Higher proportions of people with low income and low education levels;
- Higher sense of community belonging;
- Elevated prevalence of obesity and smoking rates, with lower prevalence of physical activity and fruit and vegetable consumption;
- Lower male life expectancies;
- Higher mortality from heart disease, respiratory disease, injuries and suicide; and
- Lower incidence of cancer, but higher prevalence of arthritis than urban residents.

This report follows with an overview of our methods, including how we defined rural from the multitude of definitions available. We report health status results from a list of health related indicators that is divided into five main categories. This list will give a sense of the health status of communities, but any study of health is necessarily limited by the broad definition of health and by the data sources that are available. We provide context to our findings in the results section and then finish with a general discussion around implications of these findings. The appendices include key supporting documentation including data sources used, approaches used to analyze the data, limitations, and maps of various geographies.

Methods

Definition of rural

A large land mass with relatively few people living in it is generally what comes to mind when people think of rural. There are many ways to define rural, and we have taken considerable effort to tease out the various definitions available from the literature. There is no universal agreed upon definition of rural and some note that whatever definition is used depends upon the purpose of the investigation. For example, if one were interested in tracking wildlife, ecosystem and natural topographical boundaries may be used. Because we are interested in analyzing health related indicators, then using previously collected, administrative boundaries are useful and easily understood.

Rural health researchers and policy makers have struggled to define “rural” and to measure its influence on health. Some publications have begun to address the challenges in defining rural (Heath & Szpilfogel, 2002). There are many different ways to define rural in Canada, and at least six definitions have been put forward (Du Plessis et al., 2002). In this report, we use three different sets of geographies for our region: the Metropolitan Influence Zone; Saskatoon compared to rural SHR; and public health service area.

Rural and Small Town (Metropolitan Influence Zone)

The Rural and Small Town concept developed by Statistics Canada refers to towns and municipalities outside the commuting area of large urban centres. Rural and Small Town can be further defined into Metropolitan Influenced Zones (MIZ) which is used extensively in this report (McNiven et al, 2000). The MIZ is based on commuting flows between rural and small town areas and larger Census Metropolitan Areas (CMA) or Census Agglomerations (CA). The MIZ classification system is used in the national report by DesMeules and Pong and for many indicators, a noticeable gradient to poorer health was seen in the more rural areas.

A CMA is an urban core population of at least 100,000 and includes all neighbouring Census Sub Divisions (CSD) or municipalities where: 50% or more of the employed labour force living in the CSD commutes to work in the urban core or where 25% or more of the employed labour force working in the CSD commutes to work from the urban core (Du Plessis et al., 2002). CAs have the same commuting flow thresholds as the CMAs, the only difference is the population of a CA is between 10,000 and 99,999. Saskatoon and the surrounding area is one of two CMA's in the province of Saskatchewan. The Saskatoon CMA includes Saskatoon, and all communities inside the rural municipalities of Corman Park, Colonsay, Dundurn, Blucher, and Vanscoy. There are no CAs in the Saskatoon Health Region.

The four levels of MIZ are assigned based on the share of the workforce that commutes to any CMA or CA (Du Plessis et al., 2002):

- Strong MIZ – between 30% and <50%,
- Moderate MIZ - between 5% and <30%,
- Weak MIZ - between 0% and <5%,

- No MIZ – includes all CSDs that have a workforce less than 40 people as well as any CSD that has no commuters to a CMA urban core.

Our MIZ classifications were based on 2001 census figures. When we examined our health region using the MIZ categories, we found that only one rural municipality of Aberdeen, along with the communities of Radisson, Borden, Hepburn, Laird, Domremy and Vonda were considered Strong MIZ. Because of the small population size of these communities, we grouped these communities with the Saskatoon CMA on the basis of consultations with investigators at the Canadian Population Health Initiative. For our analysis then, we used 4 different MIZ categories: CMA+Strong MIZ (hereafter referred to as CMA), Moderate MIZ, Weak MIZ, and No MIZ.

Saskatoon compared to rural SHR

We also chose to divide the health region into two, with Saskatoon as one area and everything outside the Saskatoon boundaries being rural SHR. We recognize that rural areas are heterogeneous with their own dynamics. However, this dichotomous classification system allowed us to analyze data that we otherwise could not because of small rural populations.

Public Health Service Areas

Ten public health service areas within SHR are another geography that is used for public health staff to identify their catchment areas. Humboldt, Lanigan, Rosthern, Saskatoon, Saskatoon Rural, Strassbourg, Wadena, Wakaw, Watrous, Wynyard are the areas and are based on historical host sites that were a part of health regions that existed before 1990. The host sites are still in place today as centres for public health services. Because of small population sizes in some of these areas, not all indicators were possible to analyze with this geography.

The following geographies are other ways that have been identified as potential clusters of areas for SHR. No analysis has been done at these levels in this report, but if the reader is interested in knowing more about them, they are encouraged to contact the authors of this report and data can be made available.

Residence Code Types

The Ministry of Municipal Affairs uses another set of geographies: cities; towns; villages; and rural municipalities. First Nations Reserves are excluded from the Ministry of Municipal Affairs' designation but are apart of Saskatchewan Ministry of Health's criteria. Incorporation criteria for urban municipalities are specified in sections 4, 5 & 6 of The Urban Municipality Act, 1984 (Queen's Printer, 1984):

- Rural Municipality - A rural municipality is created by a ministerial order that describes the municipal boundaries and divisions therein. Rural municipalities don't include urban municipalities, Indian reserves, park lands or regional parks. They can include hamlets (5 or more occupied dwellings) and hamlets and villages can be dissolved into the rural municipality (Saskatchewan Ministry of Municipal Affairs, 2007).

- o Village - organized hamlet with 100 population and 50 dwellings or businesses (Saskatchewan Ministry of Municipal Affairs, 2007).
- o Town - village with population of 500 (Queen's Printer, 1984)
- o City - town with population of 5,000.

Long-term Care Zones

Five long-term care zones were created by long-term care of SHR for planning purposes based on where long-term care facilities are located in the region.

Primary, Alternate, Secondary and Tertiary Care Areas

These areas identify likely catchment areas for primary health care and related services. This geography is based on data and the experiences of the Director of Rural Health for SHR.

Community Advisory Networks

Implemented in 2002, Community Advisory Networks are made up of appointed and elected individuals that advise the SHR Board on relevant health topics. The networks include Saskatoon, along with three others for the rural part of the region. The boundaries for the four networks were based on criteria that included:

- a manageable number,
- roughly equal populations with equal First Nations representation,
- acknowledging likely trade and travel patterns,
- river and other topographical attributes,
- older health districts and their advisory groups.

Statistical analysis including data sources and methods, along with limitations is shown in Appendix A. Maps of each geography are included in Appendix B. Appendix C shows the community names and residence codes for each of the geographies used in this analysis. Appendix D concludes with a list of health facilities and services available in rural SHR.

Results

We selected a set of indicators to help guide us into determining how healthy people are in rural areas of our region. There are a multitude of health indicators available, but the ones we selected were based on what has been used in past Canadian publications and through consultation with local practitioners within SHR. Most indicator results are shown using three different geographies:

- 1) Saskatoon compared to outside Saskatoon (hereafter referred to as rural SHR),
- 2) Metropolitan Influence Zone (MIZ), and
- 3) Public Health Service Areas.

I. Socio-demographics

The first set of indicators concerns population distribution and social variables that are underlying determinants of health (e.g. age, gender, income etc.).

a) Population demographics

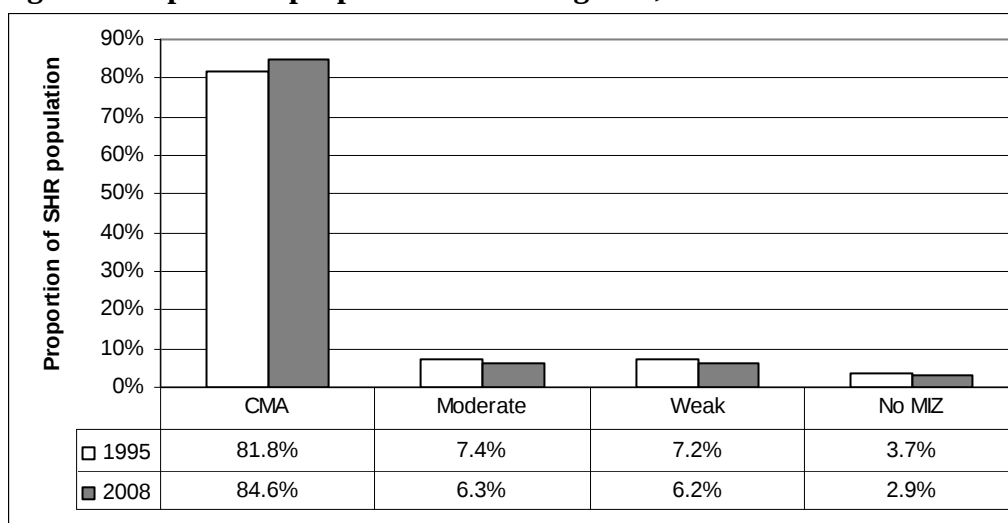
In 2008, Saskatoon Health Region had an estimated population of 298,371 using Saskatchewan Ministry of Health's Covered Population.

Saskatoon compared to rural SHR

Saskatoon had a population of 218,573 in 2008. An estimated 79,798 people lived outside Saskatoon, making up 26.7% of the SHR population. This rural proportion has decreased over time: in 1995 the rural population contributed 27.8% of the SHR population.

MIZ

An estimated 252,522 were included in the CMA in 2008. The remaining 45,849 or 15.4% of the population is located in the Moderate MIZ (18,896), Weak MIZ (18,425) and No MIZ (8,528) areas. Figure 1 shows the population proportions between 1995 and 2008 with an increasing proportion of the population in the CMA and decreasing proportions in the other three MIZ areas.

Figure 1: Population proportion MIZ categories, 1995 and 2008

Source: Saskatchewan Ministry of Health, Covered Population.

SHRs urban split based on the MIZ classification scheme (85% urban/15% rural) is very similar to that of Canada, where almost 85% of populations live in urban MIZ categories (Statistics Canada, 2003). In this way, SHRs population distribution is more similar to Canada's than to the province of Saskatchewan where only 60.3% of residents live in urban MIZ categories.

Public Health Service Areas

Populations for each of the public health service areas are shown in Table 1. Most of the populations are in Saskatoon and Saskatoon Rural areas. Saskatoon Rural roughly equates to the communities found in the CMA of Saskatoon. All of the public health service areas except for Saskatoon, Saskatoon Rural, and Rosthern have seen a decline in population between 1995 and 2007.

Table 1: Populations in each Public Health Service Area, 2008

	1995 population	2008 population	Change % since 1995
Humboldt	13,331	12,679	-4.9
Lanigan	3,442	3,072	-10.7
Rosthern	8,849	9,419	6.4
Saskatoon	198,986	218,573	9.8
Saskatoon Rural	29,139	36,007	23.6
Strasbourg	3,607	2,843	-21.2
Wadena	7,791	6,579	-15.6
Wakaw	2,975	2,755	-7.4
Watrous	3,129	2,964	-5.3
Wynyard	4,238	3,480	-17.9

Source: Saskatchewan Ministry of Health, Covered Population.

SUMMARY:

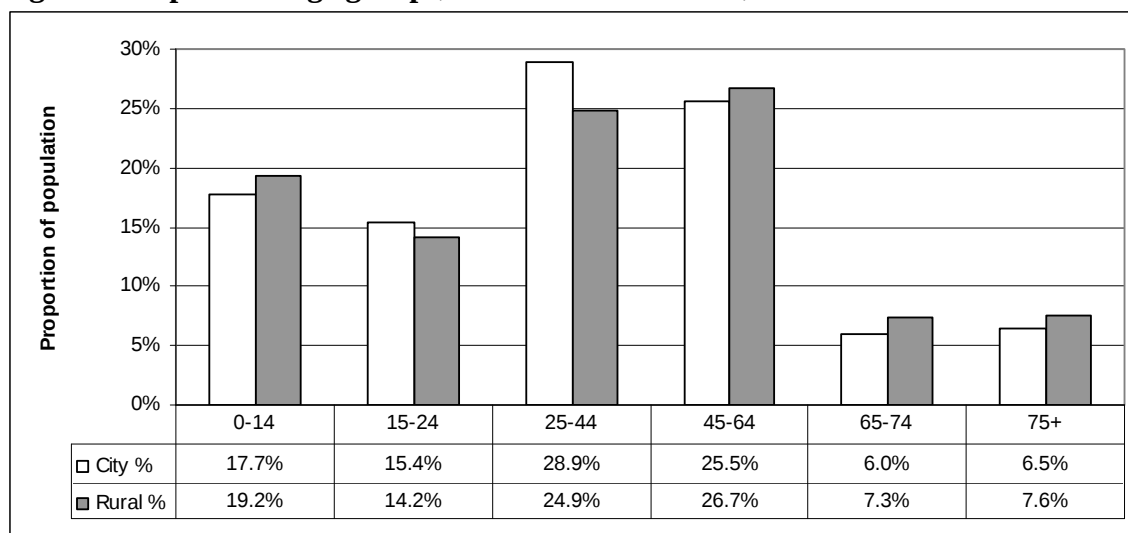
Most of SHRs population lives in and around Saskatoon, making its population distribution more similar to Canada than to Saskatchewan. Populations in almost all areas of rural SHR have been decreasing in recent years. The only areas of growth in rural have been areas immediately outside Saskatoon and Rosthern areas.

b) Population age groups

Saskatoon compared to rural SHR

Age groups for Saskatoon and rural SHR are shown in Figure 2. Rural SHR has slightly higher proportions of children 0 to 14 years (n=15,354), older adults 45 to 64 years (n=21,343), seniors 65 to 74 years of age (n=5,852) and seniors 75 years and older (n=6,075) compared to Saskatoon. Saskatoon by contrast has higher proportions of those 15 to 44 years of age. Rural SHR has a higher proportion of children partly due to the younger age structure in the bedroom communities surrounding Saskatoon.

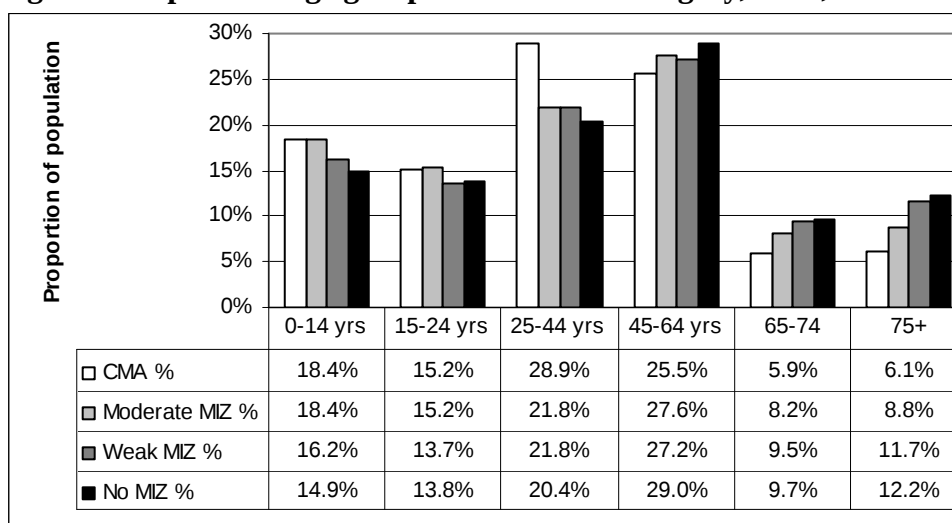
Figure 2: Population age groups, Saskatoon and Rural, 2008



Source: Saskatchewan Ministry of Health, Covered Population. .

MIZ

Age groups within each MIZ group are shown in Figure 3. The CMA and moderate MIZ had the highest proportion of children 0 to 14 years. The rural MIZ areas contain the highest proportions adults 45 to 64 years, 65 to 74 years, and 75 and over. The 75 and over proportion for the No MIZ areas at 12.2% is double that for the CMA at 6.1%.

Figure 3: Population age groups in each MIZ category, SHR, 2008

Source: Saskatchewan Ministry of Health, Covered Population. File: I:\PopHealth\Epidemiology\Chronic Disease\Rural Health Report\Population analysis\MIZ population 1995-2007.

Public Health Service Area

Analysing age groups by public health service area sheds more light on where geographically the population is distributed. Table 2 shows the public health service areas and their proportion of the population in each age group. Shading represents the two highest proportions in each age groups. As seen, the younger age cohorts tend to be clustered in the Saskatoon Rural, Rosthern and Saskatoon areas. Starting at age 45 and older, higher proportions of the population are clustered in the Strasbourg and Wakaw areas.

Table 2: Population age groups, Public Health Service Areas, 2007

	0-14	15-24	25-44	45-64	65-74	75+
Humboldt	16.6%	13.8%	22.4%	26.6%	9.6%	10.9%
Lanigan	16.9%	13.1%	21.5%	29.6%	7.7%	11.3%
Rosthern	23.5%	16.1%	23.7%	23.9%	6.3%	6.5%
Saskatoon	17.7%	15.4%	28.9%	25.5%	6.0%	6.5%
Saskatoon Rural	22.0%	14.2%	28.7%	25.9%	5.3%	3.9%
Strasbourg	9.9%	12.5%	18.6%	33.5%	12.3%	13.2%
Wadena	15.4%	14.1%	20.7%	27.3%	10.2%	12.3%
Wakaw	14.7%	12.7%	19.8%	29.2%	10.8%	12.9%
Watrous	14.1%	14.6%	19.9%	30.3%	9.0%	12.1%
Wynyard	13.9%	13.8%	21.5%	29.5%	8.6%	12.7%
SHR Total	18.1%	15.0%	27.8%	25.9%	6.3%	6.8%

Source: Saskatchewan Ministry of Health, Covered Population.

The relatively high proportion of those age 45 to 64 years and especially 75 and over in rural areas are important because many health services need to be considerate of age (e.g. home care and other community based services, diagnostics and treatment for chronic

disease). As well, many health indicators including self rated health and obesity tends to decrease as one ages (Statistics Canada, 2006).

SUMMARY:

A higher proportion of youth and young adults to age 44 years live in and around Saskatoon. Conversely, higher proportions of older adults and seniors live in rural SHR areas.

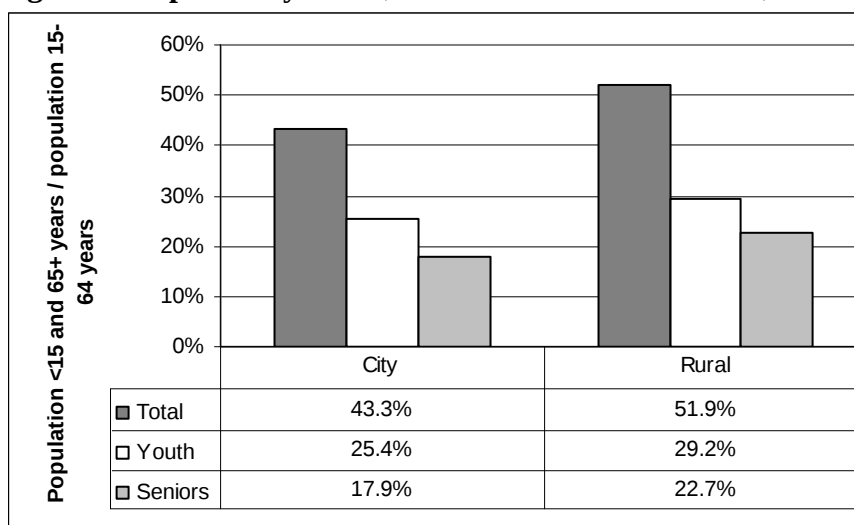
c) Dependency Ratios

Dependency ratios are an indicator used to assess the capacity of the working age population (15 to 64 years) to support the more vulnerable or non employable ages in society (less than 15 years and 65 years and over). The ratio can be divided into a youth dependency ratio and a senior's dependency ratio. The total dependency ratio is calculated by taking the number of under 15 year olds plus the 65 years and over and dividing these two by the total number of 15 to 64 year olds. A higher dependency ratio means that there are more dependent age groups in the population, which suggests a greater relative need for services targeted towards seniors and children (de Peuter & Sorensen, 2005).

Saskatoon compared to rural SHR

As shown in Figure 4, rural SHR had higher youth, senior and total dependency ratios compared to Saskatoon.

Figure 4: Dependency ratios, Saskatoon and Rural SHR, 2008



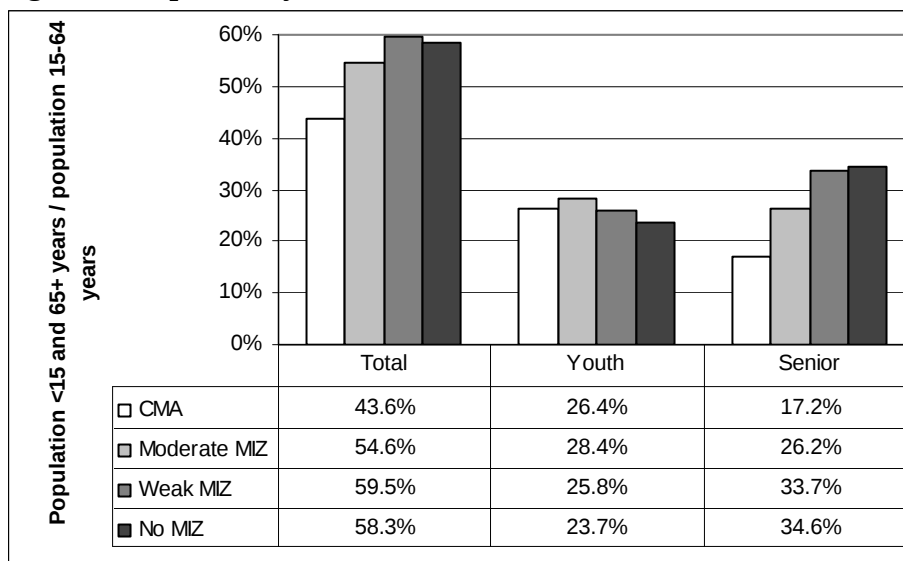
Source: Saskatchewan Ministry of Health, Covered Population.

MIZ

Figure 5 shows a gradient in the total dependency ratio from CMA to the Weak MIZ category. There are much higher senior dependency ratios in the rural MIZ categories

compared to the CMA. The inverse is true for the youth dependency ratios, where higher values are seen in the CMA and Moderate MIZ as compared to the Weak MIZ and No MIZ categories.

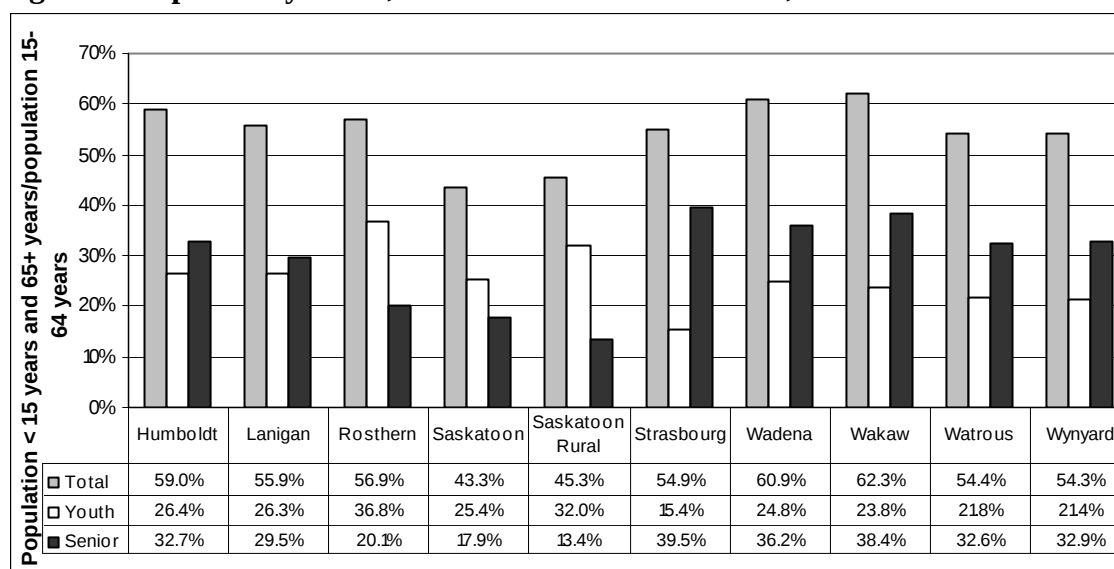
Figure 5: Dependency ratios, MIZ, 2008



Source: Saskatchewan Ministry of Health, Covered Population.

Public Health Service Areas

Figure 6 shows dependency ratios by public health service areas. The areas with the highest total dependency ratios are Wakaw and Wadena at 62% and 61% respectively. These areas along with Strasbourg also have the highest senior dependency ratios. Saskatoon and Saskatoon Rural have the lowest total dependency ratios. Rosthern area has the highest youth dependency ratio at 36.8% which is likely related to higher Aboriginal populations in this area.

Figure 6: Dependency ratios, Public Health Service Areas, 2008

Source: Saskatchewan Ministry of Health, Covered Population.

SUMMARY:

Higher youth dependency ratios are seen in Rosthern area and communities around Saskatoon. The highest senior dependency ratios occur in the most rural areas of SHR.

d) Gender

Health outcomes and health utilization are influenced by gender, so it is an important variable to examine. For example, males tend to be involved in more transportation related injuries, while females have higher rates of hospital discharges primarily because of birth-related events.

Saskatoon compared to rural SHR and MIZ

More men than women live in rural SHR, which is much different than for Saskatoon, which has over 3,500 more females than males. Table 3 shows the gender breakdown for 2008, including MIZ areas. The CMA has over 3,000 more females than males.

Several reasons have been given for this phenomenon of more males than females in rural settings. There may be more opportunities in urban centres for women to find gainful employment. Especially in the over 65 year age group, men may be more reluctant to leave the rural areas where they have worked all of their lives.

Table 3: Male and female population, Saskatoon and rural SHR and MIZ, 2008

	Saskatoon	Rural SHR	CMA	Moderate	Weak	No MIZ
Males	107,459	40,405	124,735	9,563	9,233	4,334
Females	111,114	39,393	127,787	9,333	9,193	4,194

Source: Saskatchewan Ministry of Health, Covered Population.

SUMMARY:

More males than females live in the rural areas of SHR.

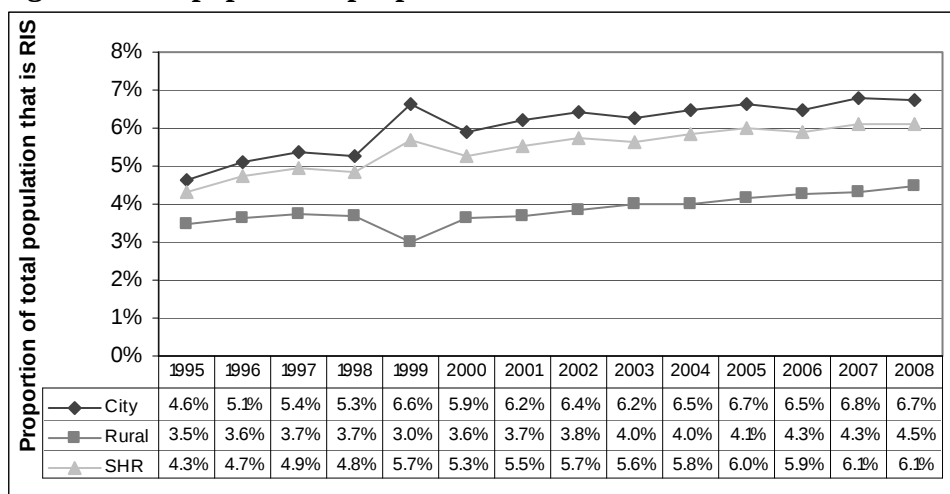
e) Registered Indian Status (RIS)

RIS is listed on Saskatchewan Ministry of Health's Covered Population and is a proxy for Aboriginal identity. RIS is an underestimate of Aboriginal identity because it does not include Métis or Inuit peoples and does not include those that would self-identify as Aboriginal even if they were not Registered Indians. Most Canadian literature to date has reported that Aboriginal identity is associated with worse health status compared to non-Aboriginals (Health Canada, 2004).

Saskatoon compared to rural SHR

The proportion of the population that is RIS has increased in both Saskatoon and rural SHR. In 2008, there were 18,274 RIS individuals in SHR with 3,556 of those living in rural. Figure 7 shows the proportion of the population that is RIS in Saskatoon and rural SHR. A larger proportion of Saskatoon's population is RIS (6.7%) compared to 4.5% in rural in 2008. This reflects the fact that many Aboriginals are living off reserves in urban areas. The spike in 1999 RIS populations had to do with Saskatchewan Ministry of Health using retired postal codes on reserves, which they stopped doing from 2000 onwards (Saskatchewan Ministry of Health, 2008).

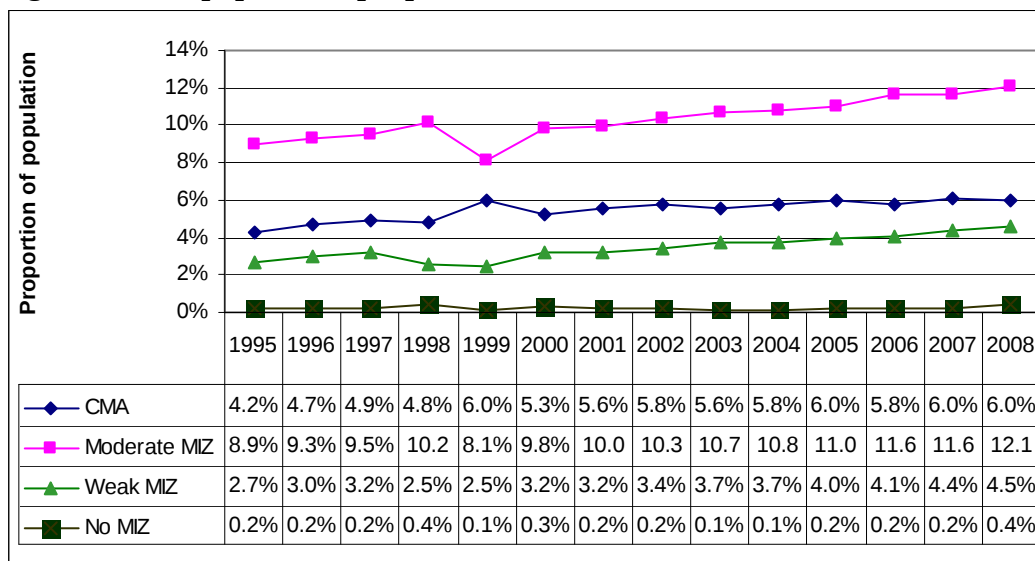
Figure 7: RIS population proportion, Saskatoon and rural SHR, 1995-2008



Source: Saskatchewan Ministry of Health, Covered Population.

MIZ

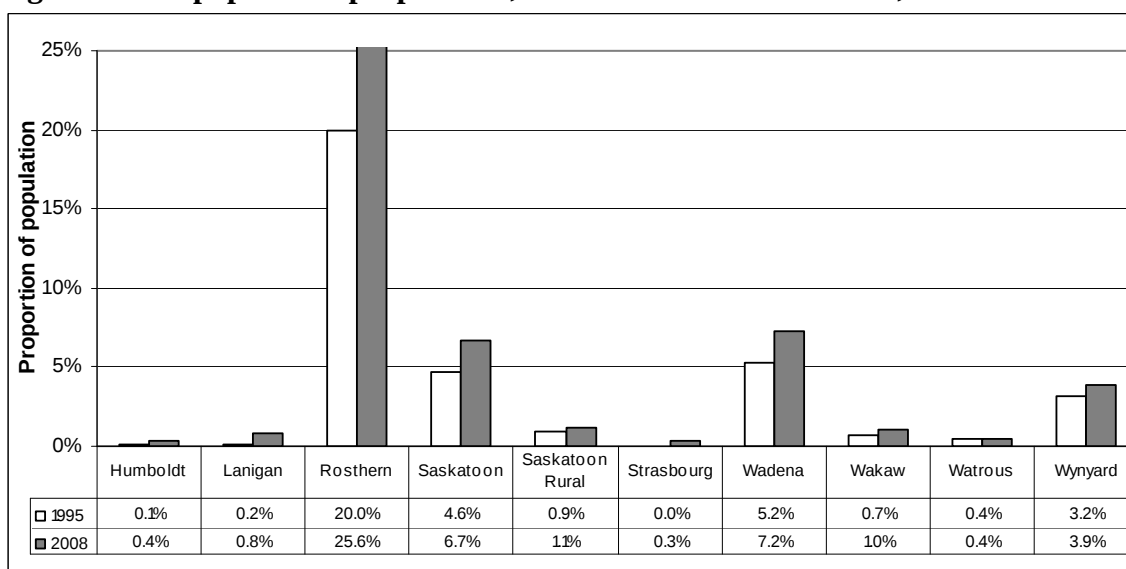
The analysis of RIS by MIZ area in Figure 8 shows similar increases in all categories except in No MIZ areas. This is mainly because none of the four First Nation's Reserves in SHR are located in the No MIZ area. The Moderate MIZ areas contain Beardy's and Okemasis and One Arrow First Nations Reserves, which help explain why the proportions are higher than any of the other areas.

Figure 8: RIS population proportion, MIZ, 1995-2008

Source: Saskatchewan Ministry of Health, Covered Population.

Public Health Service Area

By far the highest proportion of the population that is RIS is in Rosthern, at over 25% in 2008. The next highest is Wadena at 7.2% and Saskatoon at 6.7%. The two First Nations Reserves of Beardy's and Okemasis and One Arrow fall within the Rosthern catchment area. Fishing Lake First Nation is in the Wadena catchment area. Many RIS persons live off reserve in Saskatoon, which helps explain why the proportions are relatively high in the city.

Figure 9: RIS population proportions, Public Health Service Area, 1995-2008

Source: Saskatchewan Ministry of Health, Covered Population.

An increase in the numbers of Aboriginal people has been reported for Saskatchewan (De Peuter & Sorensen, 2005), so SHR is not different than the province in this respect. The large proportions of RIS peoples in the Rosthern area mask the fact that overall RIS numbers are highest in Saskatoon. Aboriginals are at a health deficit compared to non-Aboriginals for many health measures like chronic disease and suicides (Health Canada, 2004). Given the fact that RIS populations have increased, this will put increased demand for health and social services as the populations grow.

SUMMARY:

The highest proportions of RIS peoples live in the Rosthern area, along with Saskatoon and Wadena areas. RIS populations have been increasing since 1995.

f) Population Projections

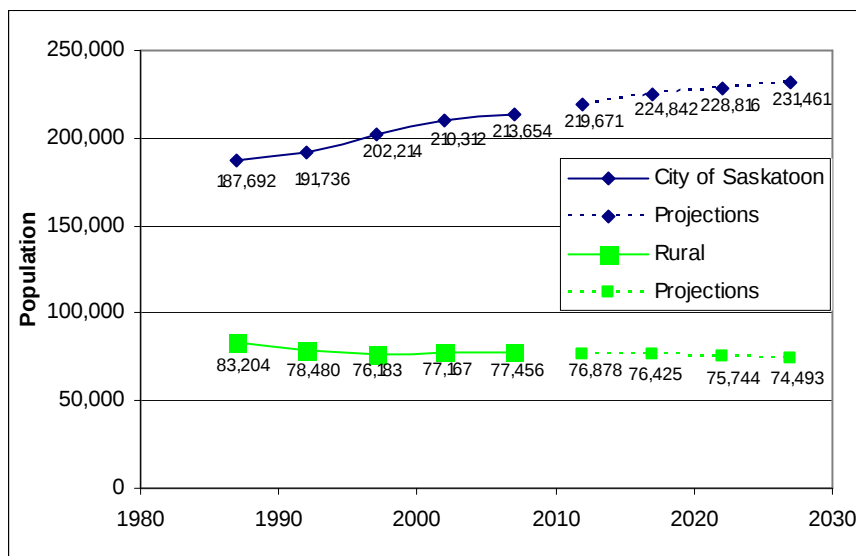
Population projections are useful to include because they help to identify future health and services needs. Projection models are based on historical population figures and developed by the Saskatchewan Ministry of Health. The following are population projections from 2007 to the year 2027.⁶

Saskatoon compared to rural SHR

Population estimates for Saskatoon show continued growth to 2027 (see Figure 10). In 2007, the actual population value was 213,654, with an estimated 231,461 residents in 2027, an 8.3% increase. Rural SHR populations show a projected 3.8% decrease, from 77,456 in 2007 to 74,493 in 2027. The rural projections should be interpreted with caution however because the actual Rural SHR population has increased in successive 5 year increments from 76,183 in 1997 to 77,456 in 2007. Part of this increase is attributable to populations growing in the bedroom communities immediately surrounding Saskatoon. Another more recent factor is an economic boom in Saskatchewan that has parlayed itself into increasing population numbers in both Saskatoon and rural SHR.

⁶ Saskatchewan Ministry of Health has updated projection models using 2008 as a base year, but categorizing by units smaller than health regions was not possible at the time of writing this report.

Figure 10: Population estimates and projections, Saskatoon and rural SHR, 1987-2027

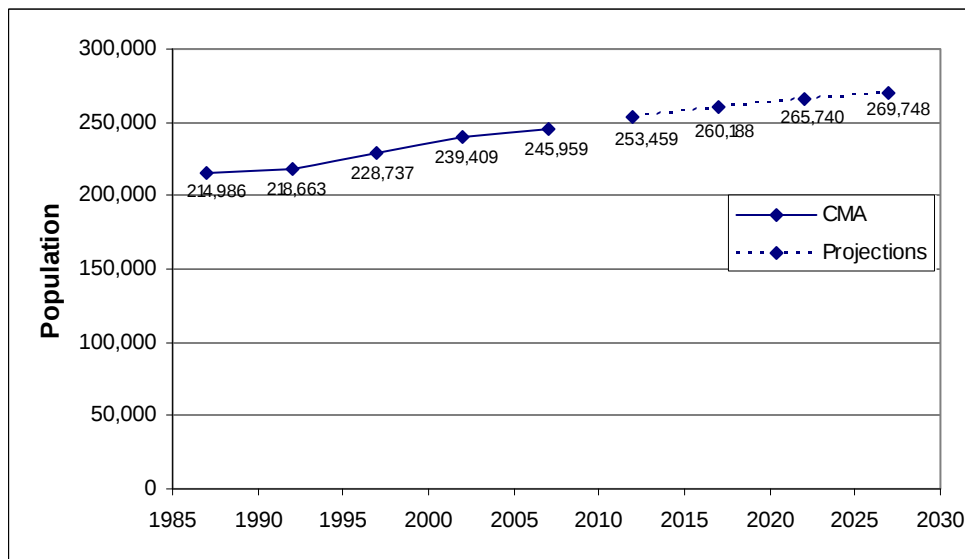


Source: Saskatchewan Ministry of Health, Covered Population.

MIZ

The CMA area has experienced a continual increase in population since 1987. Figure 11 shows that in 1987 the population of this MIZ area was nearly 215,000. In 2007, the population was nearly 246,000 and projected to reach nearly 270,000 by 2027, a 9.6% increase from 2007. This is higher than Saskatoon's population increase mainly because the bedroom communities are projected to have continued strong population growth.

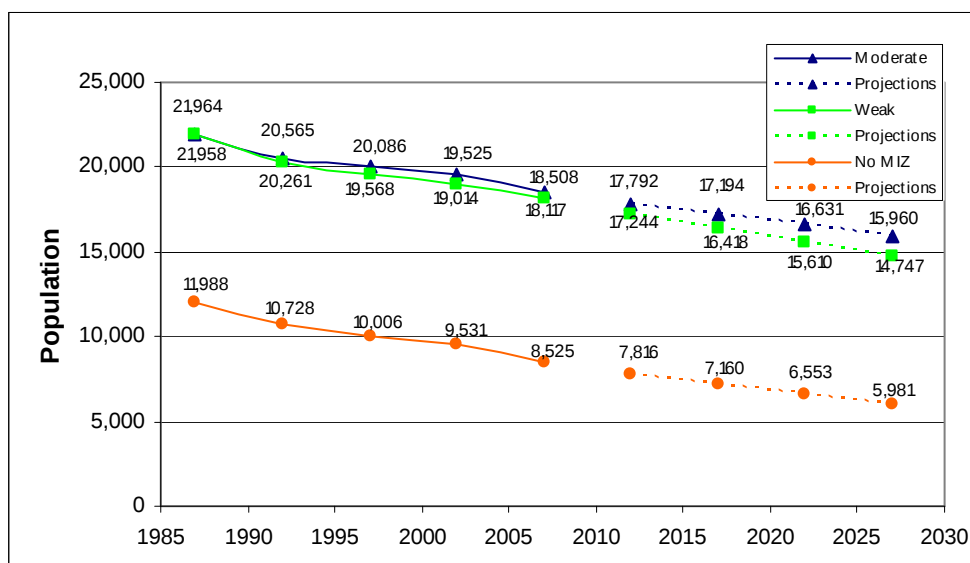
Figure 11: Population estimates and projections, CMA, 1987-2027



Source: Saskatchewan Ministry of Health, Covered Population, 2007.

The rural MIZ areas are shown in Figure 12. The Moderate MIZ, Weak MIZ and No MIZ areas have all seen their populations decrease since 1987. The Moderate MIZ and Weak MIZ have nearly identical populations of over 18,000 in 2007, down from nearly 22,000 in 1987. The No MIZ had a population of just over 8,500 in 2007 a decrease from almost 12,000 in 1987. All projections show that the decreases will continue into the future, following the same general trend seen from 1987 to 2007. As with the other geographies, caution should be noted with the projections in these rural MIZ areas as the recent economic prosperity and population in-migration in Saskatchewan may alter the trend.

Figure 12: Population estimates and projections, Moderate, Weak and No MIZ areas, 1987-2027



Source: Saskatchewan Ministry of Health, Covered Population, 2007.

SUMMARY:

Population projections for all rural areas are estimated to decrease to the year 2027. Only the Saskatoon CMA areas are projected to have increases.

g) Income, LICO, and the Deprivation Index

i) Average Personal Income

Research has shown that people's incomes are lower in rural Canada than in urban Canada (Pong, 2007). Singh (2004) showed that within each province, incomes in rural regions were lower than those in urban. For Saskatchewan the rural per capita income was about \$4,200 less than in urban areas in the year 2000 (Singh, 2004).

Saskatoon compared to rural SHR

Average personal income figures were taken from the 2006 census. Note that because income data is only released for communities that have 250 or more persons, some communities in SHR did not have any income data (25 out of a total of 115 rural CSDs did not have data).

The average personal income for Saskatoon residents in 2006 was \$34,708, a little more than \$3,000 higher than the \$30,988 value found for rural SHR residents. The difference between the two areas is lower than that reported by Singh (2004), but very consistent with the notion that people's incomes are lower in rural Canada (Pong, 2007).

MIZ

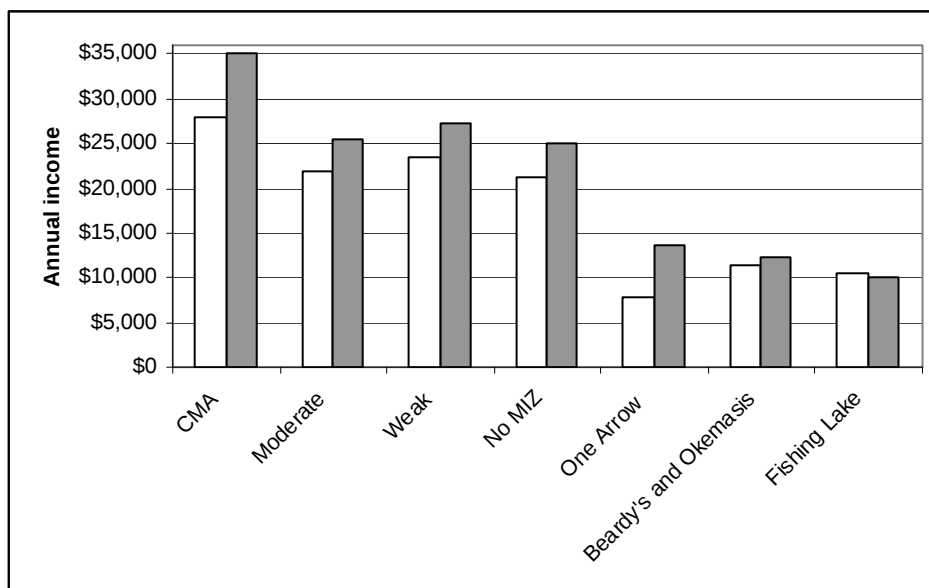
Figure 13 shows a similar story in that incomes for residents living in the CMA were just over \$35,000 in 2006 which is slightly higher than for Saskatoon itself (\$34,708). This demonstrates that residents living inside the CMA have higher incomes compared to Saskatoon residents, which are influenced by low incomes in the inner city neighbourhoods. People residing in the Moderate MIZ, Weak MIZ and No MIZ had incomes in 2006 combined around \$26,200 per year. Therefore, CMA residents had incomes about one third higher than the rest of the rural MIZs.

Figure 13 also shows that incomes have been growing in each area from 2001 to 2006, with the biggest increase in the CMA areas.

First Nations Reserves had the lowest average incomes in SHR, far below the overall MIZ numbers. Of the three Reserves that had income reported in the census, the values ranged from \$10,100 to \$13,500 in 2006.

Incomes in rural SHR are lower than in Saskatoon. One must also examine food and transportation costs, as well as housing costs to see what the cost of living is really like in rural compared to urban. This type of analysis is outside the scope of this report.

Figure 13: Average annual personal income, 15 years and older, MIZ areas, 2001-2006



Source: Statistics Canada Census, 2006.

ii) Low Income Cut Off (LICO)

One way to define poverty is by assessing the percentage of the population who live below the LICO, which is the most widely used measure of poverty in Canada. The proportion of families with income below LICO has been shown to be smaller in rural areas compared to their urban counterparts (Standing Senate Committee on Agriculture and Forestry, 2006).

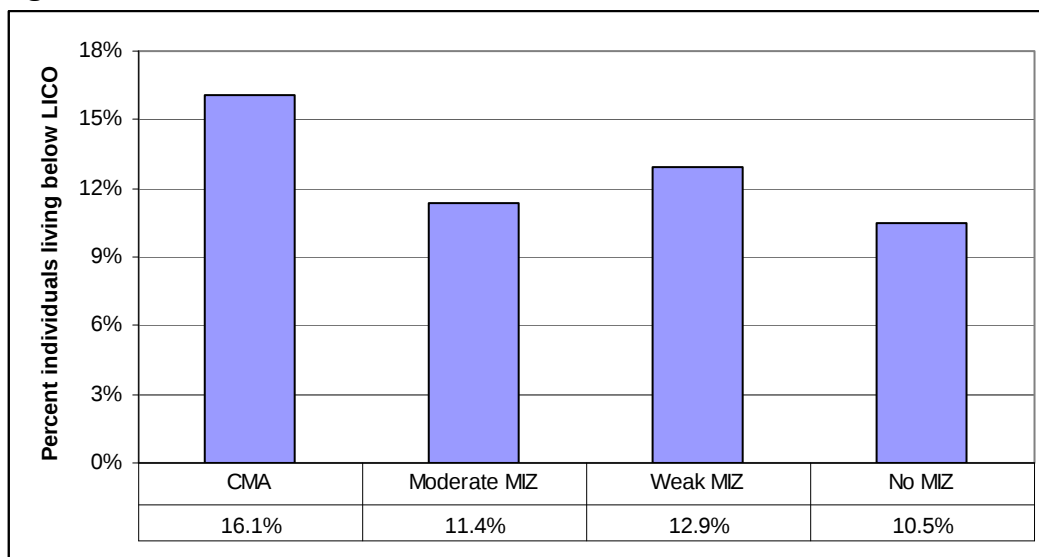
Saskatoon compared to rural SHR

The proportion of the total population with income below LICO in Saskatoon was 17.7% from the 2006 census. This compares to 10.7% in rural SHR, suggesting that rural communities are somewhat better off than urbanites because a lower proportion of their population is constrained in their ability to purchase necessities of life. The incidence of low income in rural SHR is lower than the Canadian average of 15.3% in 2006.

MIZ

The proportion of the total population below LICO in Saskatoon CMA areas was slightly lower than Saskatoon at 16.1%. This is likely due to the fact that many bedroom communities in the CMA had very low LICO values (e.g. RM of Corman Park 6.8%). The other three rural MIZ areas had lower LICO values than the CMA, as shown in Figure 14 (combined 11.8%). Not all rural communities had low percentages of people living below LICO, as the Rural Municipality of Morris had 43.5% of its population below LICO, which is a number comparable to those seen in inner city Saskatoon.

Figure 14: Percent of all individuals below Low Income Cut Off, MIZ, 2006



Source: Statistics Canada Census, 2006.

iii) Material Deprivation Index

A map showing the material deprivation index, a combination of education, employment and income indicators at the dissemination area for our region, is shown in Appendix B. The red areas are those most deprived. According to this index, all four First Nation

reserves are most deprived, along with large areas surrounding Wynyard and Wadena, and some areas north east of Saskatoon. The general look of the map though suggests that deprivation is not concentrated in any one area, but scattered throughout the region. This is in contrast to deprivation or poverty in cities, where the poor tend to be more concentrated geographically (Pong, 2007). One must remember that the index is relative, meaning that the lowest 20% of communities are highlighted compared to the highest 20%. This is not an absolute measure of poverty so it may be that the lowest 20% in rural are not as poor as the lowest 20% in Saskatoon. Further analysis of health outcomes using the deprivation index will be examined in the future.

SUMMARY:

Residents in rural SHR make less average income per year than urban residents, but proportionally fewer rural residents are considered in poverty. Poverty, or deprivation is not concentrated geographically in rural SHR, making it a challenge to provide services to small populations.

II. Health Behaviours

The Canadian Community Health Survey (CCHS) is the most comprehensive source of individual health behaviour information in Canada. The sample of 130,000 nationwide means that for each of the three cycles of the survey, Saskatoon Health Region has had approximately 1,200 people sampled. All indicators presented in this section use the combined sample from CCHS cycles 1.1, 2.1, and 3.1. The rural sample outside Saskatoon was 1,091, and outside the CMA was 668 (see Appendix A for a more detailed breakdown in each geography).

Because the total sample size for residents in the Moderate MIZ, Weak MIZ and No MIZ areas was relatively few in these three years, for certain indicators, the three MIZ areas outside the CMA were combined together. **Note that all results shown in this section on health behaviours should be viewed as preliminary because variance estimation calculations were done using the design effect not the Bootstrap weights procedure as recommended by Statistics Canada. See Appendix A for further clarification.** Other survey information on health behaviours for rural residents is necessary to understand on an ongoing basis the health status of rural residents.

a) Self-reported Health

Self-reported health is a widely used indicator for public health. Previous Canadian studies have suggested that rural residents have lower self-reported health than urban residents (Mitura & Bollman, 2003). Respondents were asked on the CCHS how they would rate their health, in general. We examined those that rated their health very good or excellent combined.

Saskatoon compared to rural SHR

In Saskatoon, 61.3% (95% CI: 58.9-63.7) of residents stated that their health generally was very good or excellent. This is slightly higher than the 59.1% (95% CI: 55.4-62.8) of rural residents that stated they had good to excellent health. The differences are not statistically significant.

MIZ

In the Saskatoon CMA, 61.5% (95% CI: 59.2-63.7) of respondents reported that they were in excellent or very good health, compared to 56.0% (95% CI: 51.2-60.8) in the other three MIZ areas combined. It was necessary to combine the three MIZ areas because small sample sizes resulted in very high sampling variability. While the self-reported health for rural residents are lower compared to the CMA residents, they are not significant as evidenced by the 95% confidence intervals.

Our results are similar to that found elsewhere, namely that rural residents experience lower self rated health than urban residents (DesMeules & Pong, 2006). Part of the explanation for this may have to do with population demographics, since seniors typically report lower self rated health than non-seniors (Statistics Canada, 2006), and rural SHR has higher proportions of seniors than in urban areas.

SUMMARY: Rural SHR residents report their health as being very good or excellent less frequently than their urban counterparts, but the differences are not significant.

b) Smoking Rates

Smoking is one of the most well known risks to good health. As such it is one of the most widely used indicators of population health status. Current smokers are defined in the CCHS as somebody who is either a daily or occasional smoker. Past literature has associated rural residence with higher smoking rates (Mitura & Bollman, 2003).

Saskatoon compared to rural SHR

In Saskatoon, 25.4% (95% CI: 23.2-27.5) of residents were current smokers. This is higher than the 21.5% (95% CI: 18.4-24.6) of rural residents that were current smokers. The differences here are not statistically significant, but are very different from the literature which has suggested that rural residents have higher smoking rates. Part of the reason for the difference may be that rural has a higher percentage of seniors and this age group has the lowest smoking prevalence in Canada (Statistics Canada, 2005).

MIZ

Because of the small sample size for this indicator, No MIZ, Weak MIZ, and Moderate MIZ areas were combined. For the three cycles combined, 22.0% (95% CI: 17.9-26.0) of residents in the three rural MIZ areas were current smokers. This proportion has high variability so Statistics Canada states that it has marginal reliability. In comparison, 24.8% (95% CI: 22.9-26.8) of residents in the CMA were considered smokers. Because the confidence intervals overlap, the differences are not statistically significant.

We also examined another population based survey that SHRs *in motion* program commissioned in 2006 that tracked physical activity and other health related information including smoking. According to Fast (2006), 16.0% of rural residents and 14.3% of urban residents were current smokers.

SUMMARY: Rural SHR residents appear to have lower smoking rates than urban, but the differences are not significant. This could be an area for follow up research to determine how much influence rural residence and/or urban/rural age structure has on smoking rates.

c) Physical Activity

Physical activity is one of the best ways to prevent heart disease, stroke, cancers, mental health and it helps facilitate weight loss (U.S. Department of Health and Human Services, 1996). Past literature points to the fact that rural and urban residents do not differ much in their leisure time physical activity rates (Mitura & Bollman, 2003).

Amount of time spent for physical activity during leisure time determines whether respondents are categorized as either inactive, moderate, or physically active based on their self-reported total daily expenditure values. We report those that are considered moderate or physically active together. Leisure time physical activity does not include activity related to work, where rural workers may be more physically active in agricultural or resource based work than their urban counterparts.

Saskatoon compared to rural SHR

Almost half of Saskatoon residents were considered either moderately or physically active: 49.2% (95% CI: 46.7-51.6) compared to 46.2% (95% CI: 42.5-49.9) of rural residents. The differences between the two are not statistically significant.

MIZ

Because of the high sampling variability, all three rural MIZ areas are combined for this indicator. The findings here are quite different compared to the above analysis. In the three rural MIZ areas, only 39.7% of respondents (95% CI: 35.0-44.4) were considered either moderately or physically active in their leisure time. In comparison 49.7% (95% CI: 47.4-52.0) of CMA residents were either moderately or physically active in their leisure time. Because the intervals do not overlap the differences are statistically significant.

We also examined the *in motion* 2006 survey to compare physical activity rates in SHR. According to Fast (2006), rural residents and urban residents had the same proportion of the population that was considered physically active enough to receive health benefits (36.5% and 37% respectively). These numbers tell a slightly different story than that using the CCHS, but it nevertheless shows that rural residents are not any more active than urban Saskatoon residents.

Our results show that including residents from the CMA alters the findings for physical activity in our region. By using the CMA communities together and comparing it with the more rural MIZ areas, we see significant differences in physical activity rates. Again, population age demographics likely affects some of the findings as physical activity rates decrease with increasing age (Statistics Canada, 2005b). Our results do match those found in Quebec where rural residents reported lower rates of physical activity (Pampalon et al, 2006b).

SUMMARY: Rural SHR residents, especially those outside the CMA area, have lower leisure time physical activity rates than urban residents.

d) Vegetable and Fruit Consumption

Eating a diet high in vegetables and fruits is one way to ensure health benefits and can help ward off heart disease and cancers (Health Canada, 2008). In the CCHS, respondents were asked about their daily servings of vegetables and fruit. Five or more servings per day is seen as the ideal number when the CCHS was first introduced, so respondents are categorized as either five or more, or less than five servings per day. Note that only two cycles of the CCHS were used in this analysis because vegetable and fruit consumption was not asked in cycle 3.1 for Saskatchewan residents.

Saskatoon compared to rural SHR

In Saskatoon, 33.6% (95% CI: 30.7-36.5) of residents reported eating at least five servings of vegetables and fruit daily. This is significantly higher statistically than the total for rural residents at 25.6% (95% CI: 21.6-29.5).

MIZ

A higher proportion of residents in Saskatoon CMA ate five or more servings of vegetables and fruit per day: 33.0% (95% CI: 30.2-35.7) compared to 19.8% (95% CI: 15.1-24.5) for residents in the three more rural MIZ categories. Even combining the three MIZ categories together, it should be noted that high sampling variability still existed for the rural respondents. The gap between urban and rural dwellers is even higher compared to Saskatoon and rural SHR analysis above. This suggests that as people live further away from metropolitan influence, there is a decrease in vegetable and fruit consumption.

Fast (2006) also surveyed SHR residents about their daily vegetable and fruit consumption. While the differences are not as stark as that reported in the CCHS, they are consistent with the fact that the percentage of rural residents who eat five or more servings of fruit and vegetables per day is less than for Saskatoon residents (36% and 39% respectively).

Our results suggest that only about one in five rural residents get the recommended amount of fruits and vegetables per day. These results should not be confounded by age distribution, as it is found that in Canada, seniors over 65 years have higher vegetable and fruit consumption than most other age groups (Statistics Canada, 2006b).

We have not found literature suggesting a link between rural residence and vegetable and fruit consumption. We did find information on food costs for both urban and rural parts of the province, which might help to better explain the fact that rural dwellers eat less fruit and vegetables than urban dwellers. The average weekly cost of a nutritious food basket in 2006 was \$166.26 for rural parts of the central and southern portions of Saskatchewan, compared to \$141.10 in the city of Saskatoon (Lints et al., 2007). We also heard from rural practitioners that availability of vegetables and fruit in rural grocery stores (where there is a store) is lacking (Marko, 2008).

SUMMARY: Rural SHR residents appear to eat less vegetables and fruit compared to urban counterparts. Part of this may be due to the higher cost of food and less access to vegetables and fruit in rural areas.

e) Overweight and Obesity

Overweight and obesity measures, and their associated risk factors of physical inactivity and poor diet, are considered one of the leading causes of death in North America (Mokdad et al., 2004) and can lead to many other chronic diseases. Past literature has shown that percentages of overweight are highest in rural areas of Canada (Mitura & Bollman, 2003).

Respondents self reported height and weight measurements on the CCHS. From this information, the body mass index was calculated. A body mass index of 25 to less than 30 is considered overweight and 30 and over is considered obese.

Saskatoon compared to rural SHR

Rural residents of SHR had a higher proportion of overweight and obese residents: 57.6% (95% CI: 53.5-61.8) compared to 52.9% (95% CI: 50.2-55.6) of Saskatoon residents. The differences are not statistically significant, but generally correspond with past literature showing rural residents have higher population proportions of overweight and obesity.

MIZ

Because of high sampling variability all three rural MIZ areas were combined. The proportion of residents who are considered overweight or obese is higher in the three rural MIZ areas at 59.6% (95% CI: 54.3-65.0) compared to 53.3% (95% CI: 50.8-55.8%) of Saskatoon CMA residents. There is no statistically significant difference because of overlapping confidence intervals.

Age distribution might be a factor in the overweight analysis, though perhaps not as much as with smoking and self-reported health. With overweight and obesity, the trend is that as one ages through the years 45 to 64, overweight and obesity increases. However, it levels off in the 65 and over age group (Statistics Canada, 2006c). Our results are similar to findings from Quebec (Pampalon et al. 2006b) and nationally (DesMeules & Pong, 2006) where overweight and obesity was shown to be higher in rural areas.

SUMMARY: Rural SHR residents appear to be more prone to overweight and obesity, though the differences are not statistically significant.

f) Community belonging

One measure of social capital is a person's sense of community belonging. High levels of social capital in a community have been linked to lower death rates and increased positive perceptions of health (Hillemeier et al., 2004). Respondents who stated they had somewhat strong to a very strong sense of community belonging are included in the results below.

Saskatoon compared to rural SHR

Rural residents had higher sense of community belonging compared to Saskatoon residents. The differences were statistically significant at 74.6% (95% CI: 71.2%-77.9%) and 65.5% (95% CI: 63.1%-67.9%) respectively.

MIZ

The three rural MIZ areas had 79% of residents (95% CI: 74.9-83.1%) report a high sense of community belonging. This was significantly higher than for residents in Saskatoon CMA areas, where 66.1% (95% CI: 63.9-68.3%) of residents reported a high sense of community belonging.

Our results are very similar to those found nationally where 77% of No MIZ residents compared to 56% of CMA residents had a somewhat to very strong sense of community belonging (DesMeules & Pong, 2006). This strong sense of community belonging may have a protective effect against some of the other less ideal health outcomes.

Table 4 summarizes the findings from the CCHS data using the MIZ areas. Rural residents have less ideal health behaviour than urban residents for most indicators examined except for smoking rates and community belonging. Caution is noted with these results as they do not take into account underlying age structures and socioeconomic variables of residents in the two areas. Rural area residents are likely more constrained in their ability to access fruit and vegetables, especially in colder winter months. Opportunities for physical activity may not be as readily available as for urban dwellers. Both of these factors may contribute to the higher overweight and obesity prevalence rates seen in rural areas.

Table 4: Comparison between urban and rural SHR residents for CCHS indicators, MIZ areas, 2001-2005.

	Rural significantly better	Rural better but not significantly	Rural worse but not significantly	Rural significantly worse
Self-report health			√	
Current smoking rate		√		
Physical activity				√
Vegetable and fruit consumption				√
Overweight and obesity			√	
Community belonging	√			

Rural = Moderate MIZ, Weak MIZ, and No MIZ. Significantly means statistically at the 95% level.
Source: CCHS 1.1-3.1 share file.

III. Health Status

a) Life Expectancy

Life expectancy is one of the most widely used population health indicators. It shows how many years someone is expected to live at birth, if the current pattern of mortality were to stay the same. It is an indicator of quantity of life years, rather than quality of life.

Saskatoon compared to rural SHR

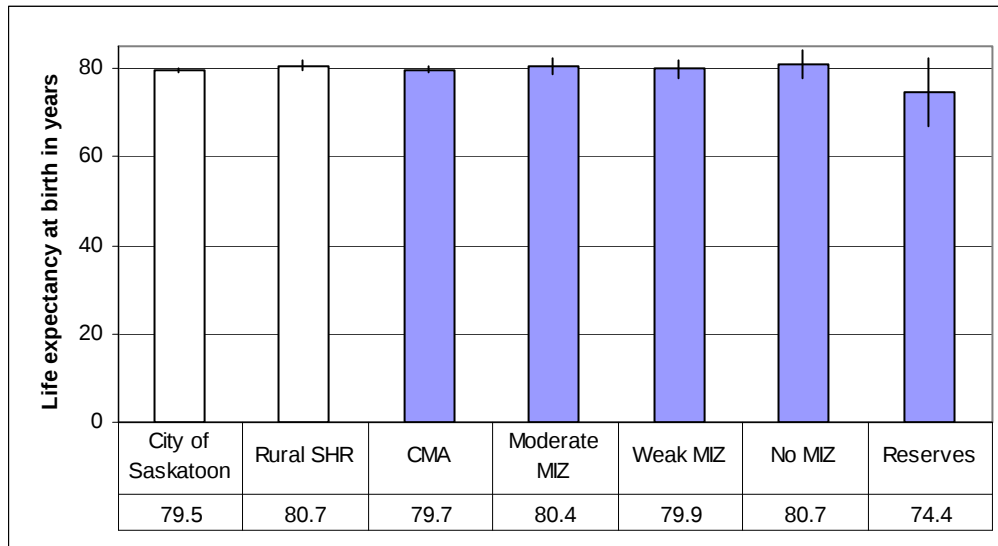
Figure 15 displays the life expectancy totals in 2004 for Saskatoon compared to rural SHR along with MIZ areas together. Interestingly, rural SHR residents have a higher life expectancy at birth at 80.7 years (95% CI: 79.7-81.6) compared to Saskatoon residents at 79.5 years (95% CI: 78.9-80.2). Taking into account the 95% confidence intervals, there is no statistically significant difference between these groups.

MIZ

Residents from No MIZ communities have higher life expectancies at 80.7 years (95% CI: 77.6-83.9) compared to all other MIZ areas including the CMA at 79.7 years (95% CI: 79.1-80.3). However, the differences are not statistically significant. Populations on the First Nations Reserves have much lower life expectancies compared to the other areas, with an average of 74.4 years, about 5.4 years less than the SHR average of 79.8.

Our SHR findings are different than those reported nationally, which showed that for males in rural areas, life expectancy was about 2.8 years less than for males in metropolitan areas. For women however, no differences were seen (DesMeules & Pong, 2006). It is not known why SHR rural residents have at least as high life expectancy as Saskatoon residents and this could be the subject for future research.

Figure 15: Life expectancy at birth, Saskatoon compared to rural SHR and MIZ areas, 2004



Source: Saskatchewan Ministry of Health, Vital Statistics and Covered Population.

SUMMARY:

Life expectancy is no different between rural residents and urban in SHR. However, life expectancy on First Nations Reserves is less than for other residents of SHR, though not statistically significantly different.

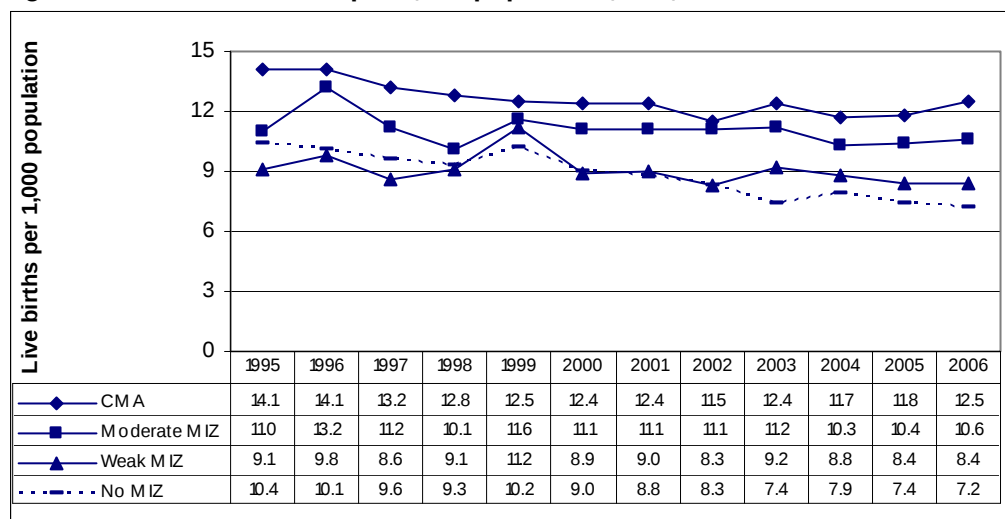
b) Birth Rates

Saskatoon compared to rural SHR

The crude birth rate is the number of live births divided by the population, and is expressed per 1,000 population. In Saskatoon and rural SHR, crude birth rates have been decreasing over time, with Saskatoon having a slightly higher birth rate than for rural SHR in 2006 (12.3 and 11.1 per 1,000 population respectively).

MIZ

Examining crude birth rates by MIZ area shows an interesting gradient as there are lower birth rates seen in the more rural MIZ areas (see Figure 16). In all MIZ areas, the birth rates have been decreasing over time, except for the Moderate MIZ, which has a fairly stable birth rate. Much of this could be attributable to the fact that First Nations Reserves birth rates tend to be higher than the SHR average, and two of the four First Nation's Reserves located in SHR are within the Moderate MIZ boundary.

Figure 16: Crude birth rate per 1,000 population, MIZ, 1995-2006

Source: Saskatchewan Ministry of Health Vital Statistics, 2006.

SUMMARY:

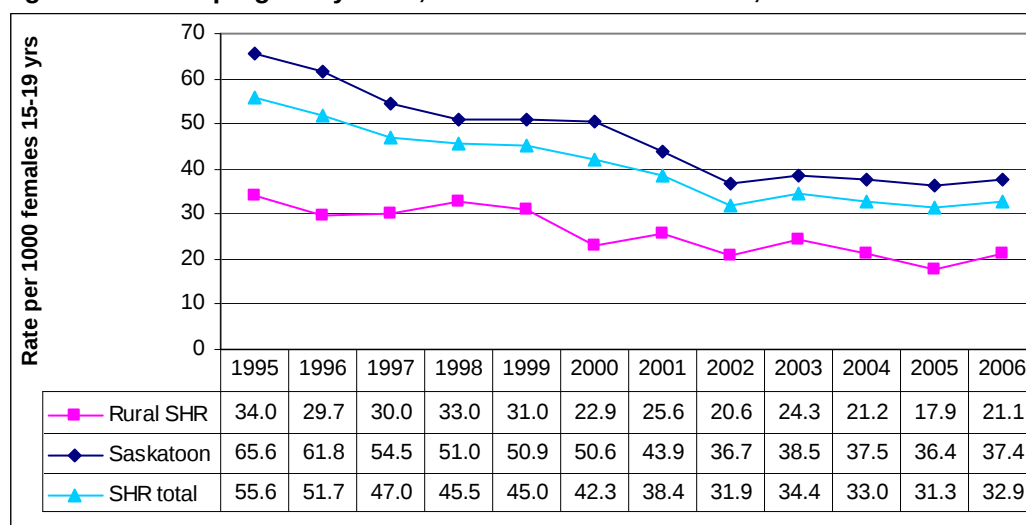
Crude birth rates have fallen in both urban areas and rural, except for areas containing rural First Nations Reserves.

c) Teen Pregnancy Rate

The teenage pregnancy rate comprises the number of births, stillbirths and abortions (both therapeutic and miscarriages) for those age 15 to 19 years, divided by the female population 15 to 19 years. It is an important pregnancy related indicator because females in this age group who give birth tend to have higher pregnancy related complications including infant mortality. They also tend to have lower levels of prenatal care, and social determinants like education, employment and income are a concern for this age group.

Saskatoon compared to rural SHR

The teen pregnancy rate in Saskatoon has been higher than rural SHR every year from 1995 to 2006. Note that the teen pregnancy rates have been decreasing every year between 1995 and 2002 and have since stabilized as shown in Figure 17.

Figure 17: Teen pregnancy rates, Saskatoon and rural SHR, 1995-2006

Source: Saskatchewan Ministry of Health Vital Statistics, 2007.

MIZ

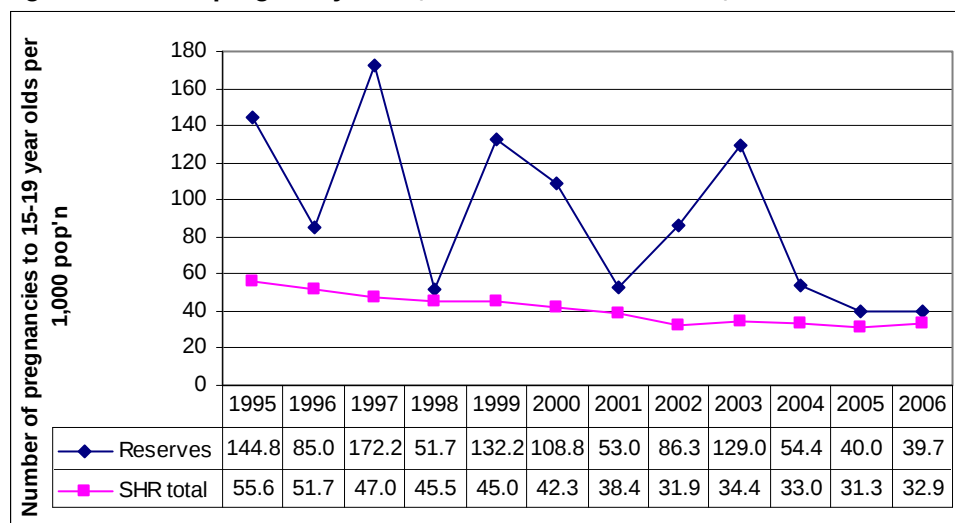
Because the teen pregnancy numbers were quite small in rural SHR, the three rural MIZ areas were combined into one. The CMA teen pregnancy rate was higher (40.5 95% CI: 39.1-41.8) than for the rural MIZs (27.1 95% CI: 24.8-29.5) between the years 1997 and 2006. These differences are not as marked as the Saskatoon compared to rural analysis, which shows the mediating effect the CMA communities have on this rate.

Public Health Service Area

Analyzing the teen pregnancy rates by Public Health Service area for the years 1997 to 2006 combined, shows that the Rosthern catchment area (49.6 per 1,000, 95% CI: 42.7-56.5) and Saskatoon (43.6 per 1,000, 95% CI: 42.1-45.1), had significantly higher rates than the SHR total of 38.1 per 1,000 (95% CI: 36.9-39.3). The Rosthern area services two First Nation's reserves which helps explain these numbers as Aboriginal teen pregnancy rates are higher than for non-Aboriginal populations.

First Nations Reserves

Between 1997 and 2006 there were 122 teen pregnancies on SHR First Nations Reserves which equates to a rate of 86.1 (95% CI: 70.8-101.4). The SHR average for these years was 38.1 (95% CI: 36.9-39.3). The reserves teen pregnancy rates were significantly higher than the SHR average as seen in Figure 18.

Figure 18: Teen pregnancy rates, First Nations Reserves, 1995-2006

Source: Saskatchewan Ministry of Health Vital Statistics, 2007.

SUMMARY:

Teen pregnancy rates have fallen dramatically since 1995 in both urban and rural SHR. Much higher teen pregnancy rates are seen in the rural First Nations Reserves of SHR.

d) Infant Mortality Rate

The infant mortality rate is the number of deaths of live born babies in their first year of life, per 1,000 live births. It is one of the most widely recognized public health indicators, and reflects health status and health care of the population as well as effectiveness of preventive care and maternal and child health (Saskatchewan Ministry of Health, 2007b). Mother's residence code determines which geographic area the infant death gets coded to.

Because infant deaths are a relatively rare phenomenon, it was necessary to group together 10 years worth of infant death and live birth data to get an accurate sense of the trends. Past literature has shown an increase in infant mortality in rural areas in Canada compared to urban (Romanow, 2002).

Saskatoon compared to rural SHR

The infant mortality rate for Saskatoon for the years 1997 to 2006 was 6.3 per 1,000 live births (95% CI:5.3-7.3). This rate is higher than that for rural SHR which was 5.0 per 1,000 live births (95% CI:3.5-6.5). Because of the overlapping confidence intervals, there is no significant difference. Looking into possible factors implicated in these infant deaths, a few interesting findings arise. Looking at Table 5, more of the infant deaths in Saskatoon were associated with low birth weight, preterm births, or to mothers of Registered Indian Status compared to rural SHR. Interestingly, there was no difference in teen age moms between the two areas, and there were more twins or triplet deaths to

mothers in rural compared to urban. Some of these findings may be useful for further research.

Table 5: Percent of infant deaths related to various factors, Saskatoon compared to rural SHR, 1997-2006

	Saskatoon	Rural SHR
Low birth weight (<2,500g)	56.8%	51.3%
Preterm births (<37 weeks)	58.3%	45.2%
Mothers age (< 20 years)	14.8%	14.6%
Registered Indian Status	25.0%	19.0%
Twins or triplets	8.3%	14.3%

Source: Saskatchewan Ministry of Health, Vital Statistics.

MIZ

Because the numbers of infant deaths is very small in the Moderate MIZ, Weak MIZ and No MIZ areas, it was necessary to analyze these three areas together. Similar to Saskatoon and rural SHR analysis, the CMA had an infant mortality rate of 6.1 per 1,000 live births (95% CI: 5.2-7.0) for the years 1997-2006. This is higher, but not significantly different statistically from the rural MIZ areas rate of 5.3 per 1,000 live births (95% CI: 3.2-7.5).

First Nations Reserves

From 1997 to 2006 combined, there were 6 infant deaths on First Nations Reserves, which translates to an infant mortality rate of 17.6 per 1,000 live births (95% CI: 3.5-31.7). This is higher, but not significantly different from the SHR rate of 6.0 per 1,000 live births (95% CI: 5.1-6.8).

The fact that the infant mortality rates are higher in the main urban centre of SHR compared to rural is different than findings shown in Romanow (2002) where Canadian infant mortality rates were shown to be higher in rural settings compared to urban.

SUMMARY:

Infant mortality rates are higher in urban SHR compared to rural, though not statistically significant.

e) Preterm Birth Rate

The preterm birth rate is defined as the number of preterm births (less than 37 completed weeks) per 100 live births in a given year. Preterm birth is considered the most important contributor to pregnancy related complications like low birth weight and infant mortality (World Health Organization, 2006). For this analysis, all deliveries of unknown gestation period were excluded.

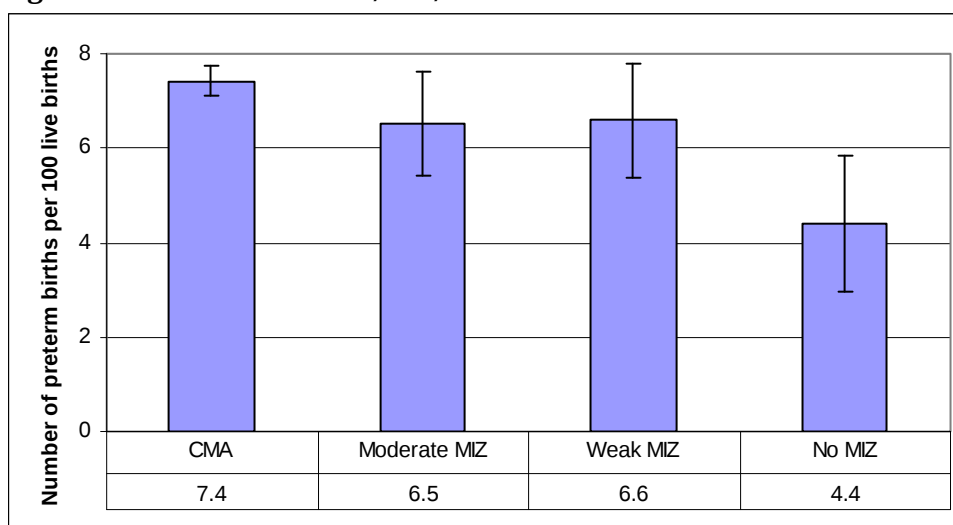
Saskatoon compared to rural SHR

The preterm birth rate for Saskatoon for the years 1997 to 2006 was 7.5 per 100 live births (95% CI: 7.1-7.8). This rate is higher than that for rural SHR which was 6.6 per 100 live births (95% CI: 6.0-7.1). Because the confidence intervals do not overlap we are reasonably assured that the rates are significantly different statistically. We examined the preterm birth rates to see if there were more multiple births occurring amongst those urban mothers that might explain the higher preterm rate. However, we found that preterm births to rural mothers had a higher percent of multiples (21.9% compared to 18.7% respectively).

MIZ

Figure 19 shows the preterm birth rates from 1997-2006 for each of the MIZ areas in SHR. A clear gradient is seen showing lower preterm birth rates in increasingly rural settings. CMA residents had a preterm birth rate of 7.4 per 100 live births (95% CI: 7.1-7.7) whereas the No MIZ has the lowest preterm birth rate of 4.4 per 100 live births (95% CI: 3.0-5.9). Only the CMA and No MIZ values are significantly different statistically. All three rural MIZs together yielded a preterm birth rate of 6.2 (95% CI 5.5-6.9) which is significantly lower statistically than the CMA rate.

Figure 19: Preterm birth rate, MIZ, 1997-2006



Source: Saskatchewan Ministry of Health Vital Statistics, 2006.

First Nations Reserves

From 1997 to 2006 combined, there were 23 preterm births on SHR First Nations Reserves. This translates to a preterm birth rate of 6.7 per 1,000 live births (95% CI: 4.0-9.5). This is lower, but not significantly different statistically from the SHR rate of 7.2 per 1,000 live births (95% CI: 7.0-7.5).

f) Low Birth Weight

The low birth weight rate is the proportion of infants born under 2,500 grams compared to total live births in a given year. It is considered to be one of the strongest predictors of infant mortality (Strobino et al., 1995). For this analysis, all deliveries of unknown birth weight were excluded.

Saskatoon compared to rural SHR

The percentage of live births that are low birth weight for residents of Saskatoon for the years 1997 to 2006 was 5.8% (95% CI: 5.5-6.1). This rate is higher than that for rural SHR residents which was 4.7% (95% CI: 4.3-5.2). Because the confidence intervals do not overlap, the rates are significantly different statistically. We again examined the low birth weights by multiple births to see if this is what is explaining the increased low birth weight in urban mothers. However, more low birth weight births were multiples in rural mothers compared to urban mothers (27.3% compared to 21.9%).

MIZ

As with the preterm birth weights, lower percentage of low birth weights in the rural MIZ settings are seen. CMA residents had a low birth weight rate of 5.6% (95% CI: 5.4-5.9) decreasing to the No MIZ which had 4.4% low birth weight (95% CI: 3.0-5.9). None of the confidence intervals overlap, so we cannot say that these differences are statistically significant. All three rural MIZs together yielded a low birth weight value of 5.0% (95% CI 4.3%-5.6%) which is not statistically different from the CMA figure of 5.6%.

First Nation Reserves

From 1997 to 2006 combined, there were 12 low birth weight births on the SHR First Nations Reserves. This translates to a low birth weight rate of 3.5 per 1,000 live births (95% CI: 1.5-5.5). This is lower, but not statistically different from the SHR rate of 5.5 per 1,000 live births (95% CI: 5.0-6.0).

SUMMARY:

Preterm birth rates and low birth weight percentages are both lower in rural than urban SHR.

Preterm birth rates and percent low birth weight, show higher rates in Saskatoon compared to rural SHR regions. These findings, alongside the infant mortality findings run contrary to the literature in this field which suggests that rural areas have worse pregnancy related outcomes (Romanow, 2002). The higher teen pregnancy rates in Saskatoon may help to explain these differences, since teen mothers are at increased risk of insufficient prenatal care. The effect of multiple births does not seem to account for these findings as rural mothers tend to have higher multiple births in the preterm and low birth weight categories. Further research may be needed in this area to understand the protective effect rural place has on pregnancy related outcomes.

IV. Mortality/Health Care Utilization

Health care managers and planners are particularly interested in comparing hospitalization and death data from different rural areas. This section highlights analysis from vital statistics mortality and hospital discharge data.

a) Mortality

Mortality data come from Vital Statistics within the Ministry of Health where all deaths are registered. The data included in this analysis are for SHR residents, no matter where they die. We grouped the years 1995 to 2006 together to ensure we had sufficient sample size within each cause of death category. Rates are shown as deaths per 10,000 population instead of per 100,000 because population sizes in many areas of rural SHR are considerably less than 100,000.

i) All-cause mortality

Saskatoon compared to rural SHR

Table 6 shows that all-cause mortality rates are significantly higher statistically in Saskatoon (69.9 per 10,000), compared to rural SHR (66.0 per 10,000). Within the rural MIZ areas, there is no difference statistically between any of the areas, with the Moderate MIZ showing a slightly higher rate (71.6 per 10,000). There are no statistically significant differences in all-cause mortality rates between rural MIZ residents and CMA residents in SHR.

Table 6: Age-sex standardized mortality by cause of death per 10,000 population, Saskatoon compared to rural SHR and MIZs, 1995-2006

	Saskatoon	Rural	CMA	Moderate MIZ	Weak MIZ	No MIZ	Rural MIZs
All-cause	69.9 (68.9-70.9)	66.0 (64.5-67.5)*	68.4 (67.4-69.3)	71.6 (68.8-74.5)	69.4 (66.7-72.1)	67.5 (63.8-71.2)	69.8 (68.1-71.5)
Injury ^a	4.4 (4.1-4.7)	4.8 (4.4-5.2)	4.3 (4.1-4.5)	5.0 (4.2-5.8)	5.3 (4.4-6.2)	4.6 (3.5-5.7)	5.0 (4.5-5.5)
Circulatory disease ^b	25.1 (24.5-25.7)	25.3 (24.5-26.2)	24.6 (24.0-25.2)	26.7 (25.0-28.4)	27.5 (25.9-29.2)	26.2 (24.0-28.4)	26.9 (25.9-27.9)*
All cancers ^c	17.1 (16.6-17.6)	16.4 (15.7-17.1)	16.9 (16.4-17.3)	16.7 (15.3-18.1)	16.4 (15.1-17.7)	18.6 (16.7-20.6)	17.0 (16.1-17.9)
Respiratory ^d	6.4 (6.1-6.7)	5.0 (4.6-5.4)*	6.2 (5.9 – 6.5)	5.9 (5.1-6.7)	4.7 (4.0-5.4)*	5.2 (4.2-6.2)	5.3 (4.8-5.9)
Motor vehicle collisions ^e	0.8 (0.7-0.9)	1.7 (1.4-2.0)	0.9 (0.8-1.0)	1.9 (1.4-2.4)	1.8 (1.3-2.3)	1.4 (0.8-2.0)	1.8 (1.5-2.1)
Suicide ^f	1.1 (1.0-1.2)	1.0 (0.8-1.2)	1.1 (1.0-1.2)	0.5 (0.2-0.8)	1.2 (0.7-1.7)	1.6 (0.8-2.4)	1.0 (0.7-1.3)

Note: (95% CI).

a. Injury deaths in ICD-9 coded E800-E999 excluding medical misadventures E870-E879 and adverse effects to drugs E930-E949. Injury deaths in ICD-10 coded V01-Y98 excluding medical misadventures Y60-Y69, Y71-Y84 and Y88.1 and adverse effects to drugs Y40-Y59, Y70 and Y88.1.

b. Circulatory disease deaths in ICD-9 coded 390.0-459.9. Heart disease deaths in ICD-10 coded I00-I99.

c. Cancer deaths in ICD-9 coded 140.0-172.9 and 174.0-208.9. Cancer deaths in ICD-10 coded as C00-C43 and C45-C97. These exclude malignant neoplasms of the skin, and benign, uncertain, and in situ cancers.

d. Respiratory deaths in ICD-9 coded 460.0-519.9. Respiratory deaths in ICD-10 coded J00-J99.

e. Motor vehicle collision deaths in ICD-9 coded E800-E829. In ICD-10 coded V01-V89.

f. Suicide deaths in ICD-9 coded 950-959. Suicide deaths in ICD-10 coded X60-X84 and Y87.0.

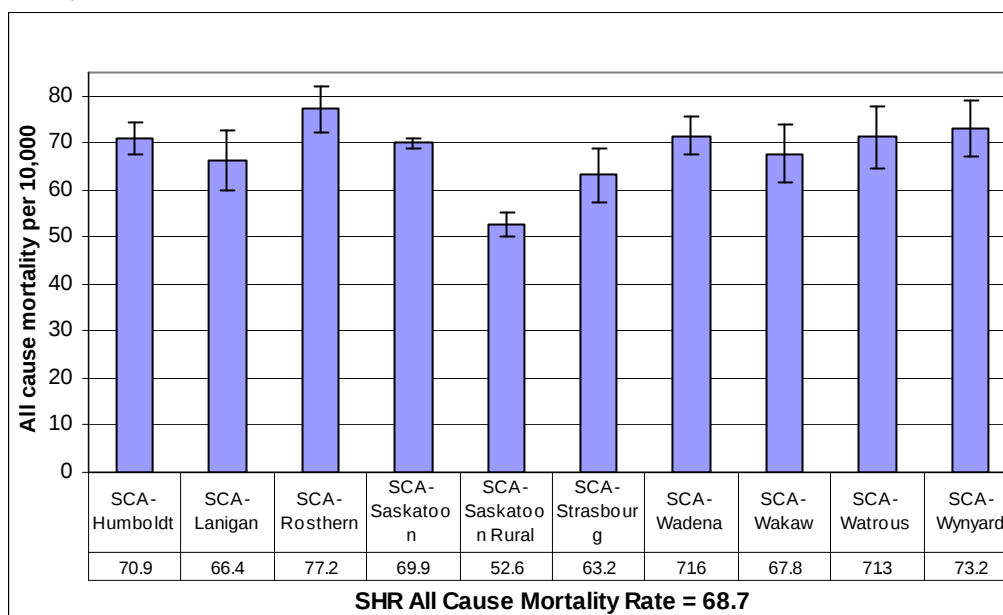
*Significantly different than either the Saskatoon or CMA rate based on non-overlapping confidence intervals.

Source: Saskatchewan Ministry of Health, Vital Statistics, 2006.

Public Health Service Areas

Analyzing all-cause mortality by Public Health Service area is more revealing in terms of where the differences lie (see Figure 20). Most of the geographies have similar rates to the SHR total with Rosthern area 77.3 per 10,000 (95% CI: 72.3-82.3) being the only area that has a rate significantly higher than the SHR total of 68.7 per 10,000 (95% CI: 67.9-69.5). Saskatoon Rural 52.6 per 10,000 (95% CI: 50.1-55.1) had the lowest all-cause mortality rates and is significantly lower than the SHR total.

Figure 20: All-cause mortality rate age-sex standardized, Public Health Service areas, 1995-2006



Source: Saskatchewan Ministry of Health, Vital Statistics.

First Nation Reserves

Between 1995 and 2006 there were 117 deaths on First Nation Reserves in SHR. This equates to an all cause mortality rate of 73.8 (95% CI: 60.4-87.2) which is higher, but not statistically different from the SHR rate of 68.7 (95% CI: 67.8-69.5)

ii) Injury mortality

Saskatoon compared to rural SHR and MIZs

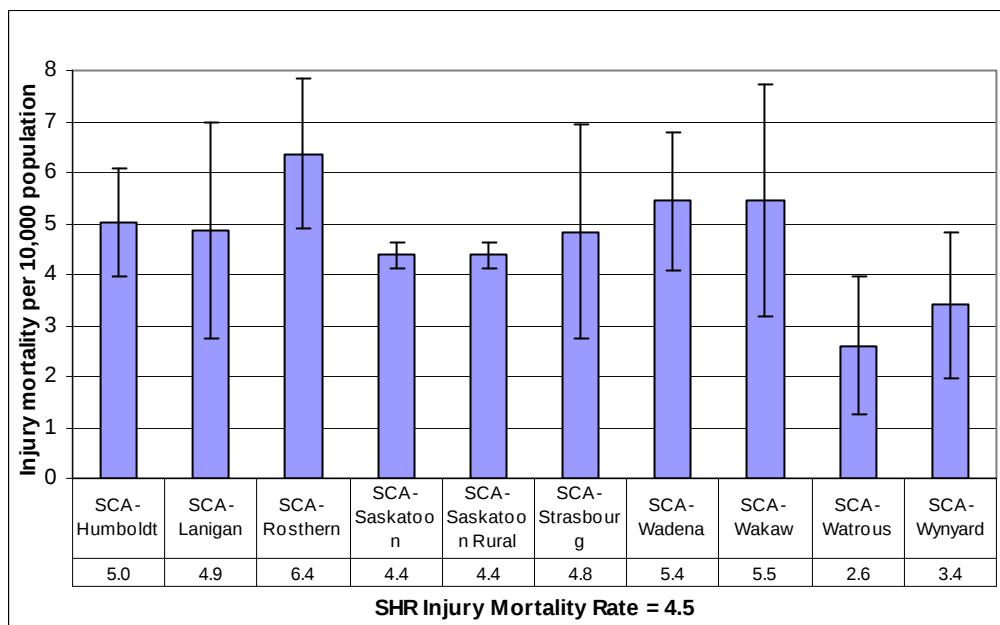
Rural areas had slightly higher injury mortality rates than for residents living in Saskatoon (4.8 per 10,000 compared to 4.4 per 10,000). The differences were not statistically significant. Within the rural areas, Moderate MIZ and Weak MIZs had the highest injury mortality rates at 5.0 and 5.3 per 10,000 respectively, while the CMA and No MIZ were lower at 4.3 and 4.6 per 10,000 respectively. In all cases, males had higher injury rates than females.

Our findings are slightly different than for those shown nationally where increasing injury rates were seen as one moved from the CMA to the No MIZ areas (DesMeules & Pong, 2006).

Public Health Service Areas

Analysis of injury mortality by Public Health Service areas is shown in Figure 21. Most of the geographies have similar rates to the SHR total of 4.5 per 10,000 with Rosthern area higher at 6.4 per 10,000 (95% CI: 4.9-7.9). Watrous at 2.6 per 10,000 (95% CI: 1.2-4.0) had the lowest injury mortality rates, significantly lower statistically than the SHR total.

Figure 21: Injury mortality rate age-sex standardized, Public Health Service areas, 1995-2006



Source: Saskatchewan Ministry of Health, Vital Statistics.

iii) Heart Disease Mortality

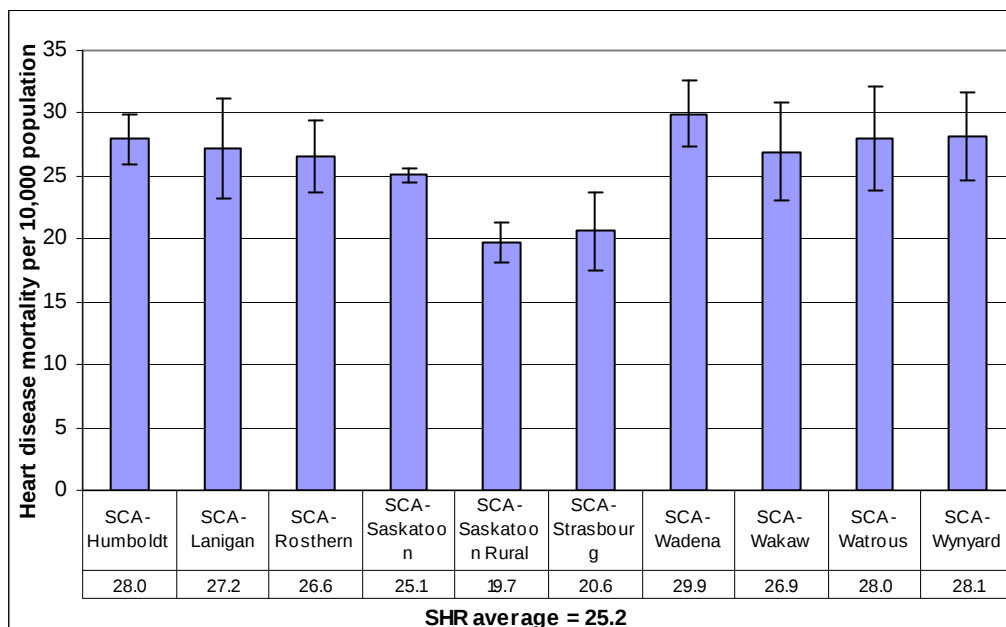
Saskatoon compared to rural SHR and MIZs

Heart disease death rates varied little between the City of Saskatoon (25.1 per 10,000) and Rural (25.3 per 10,000). The difference is not statistically significant. Examining heart disease mortality by MIZ areas shows a slightly different picture; with residents from the CMA having lower rates (24.6 per 10,000) compared to all other MIZ areas. Moderate MIZ, Weak MIZ and No MIZ had the highest heart disease rates, which are similar to national findings, however SHR differences were not statistically significant except for the Weak MIZ.

Public Health Service Areas

Analysis of heart disease mortality by Public Health Service areas is shown in Figure 22. Both Humboldt and Wadena show significantly higher heart disease mortality rates than for the SHR total of 25.2 per 10,000 (95% CI: 24.7-25.7). Saskatoon rural and Strasbourg both had statistically significant lower heart disease mortality rates than the SHR total.

Figure 22: Heart disease mortality rate age-sex standardized, Public Health Service areas, 1995-2006



Source: Saskatchewan Ministry of Health, Vital Statistics.

iv) Cancer mortality

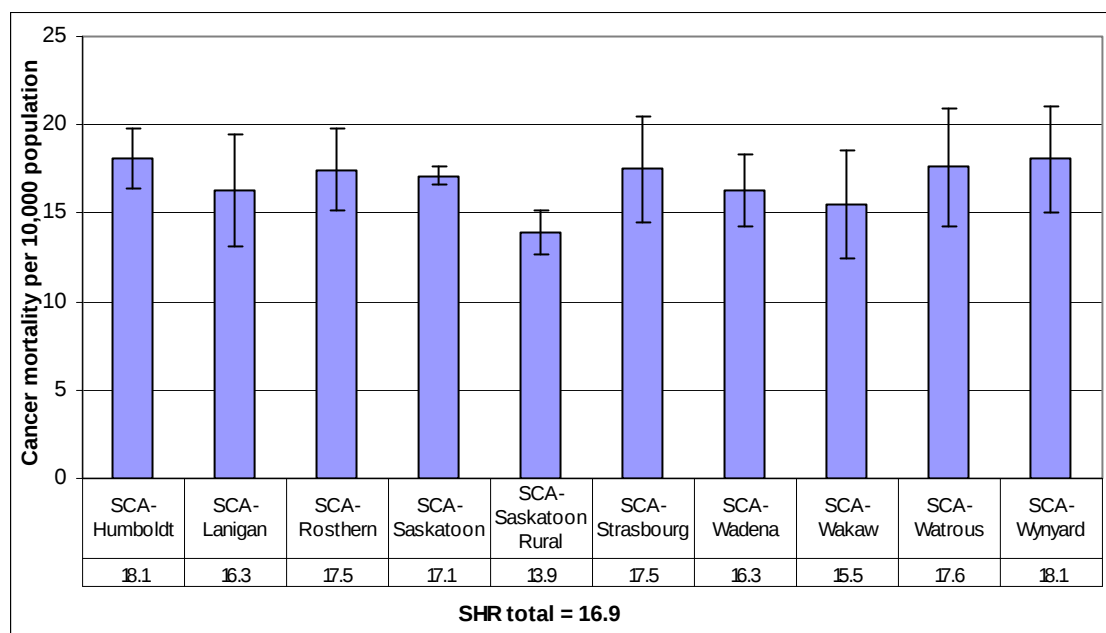
Saskatoon compared to rural SHR and MIZs

Cancer deaths show a higher rate for Saskatoon residents compared to rural SHR (17.1 per 10,000 and 16.4 per 10,000 respectively), though the differences are not statistically significant. Residents of No MIZ areas have higher cancer mortality rates (18.6 per 10,000) compared to the other MIZ areas, but none of the differences are statistically significant. Our results are consistent with national reports that found no increased risk of cancer death among rural residents (DesMeules & Pong, 2006).

Public Health Service Areas

Analysis of cancer mortality by Public Health Service areas is shown in Figure 23. No geographies have statistically higher rates than the SHR average rate of 16.9 per 10,000 (95% CI: 16.5-17.3). Saskatoon rural had a statistically significant lower cancer mortality rate at 13.9 per 10,000 (95% CI: 12.7-15.1) than the SHR total.

Figure 23: Cancer mortality rate age-sex standardized, Public Health Service areas, 1995-2006



Source: Saskatchewan Ministry of Health, Vital Statistics.

v) Respiratory mortality

Saskatoon compared to rural SHR

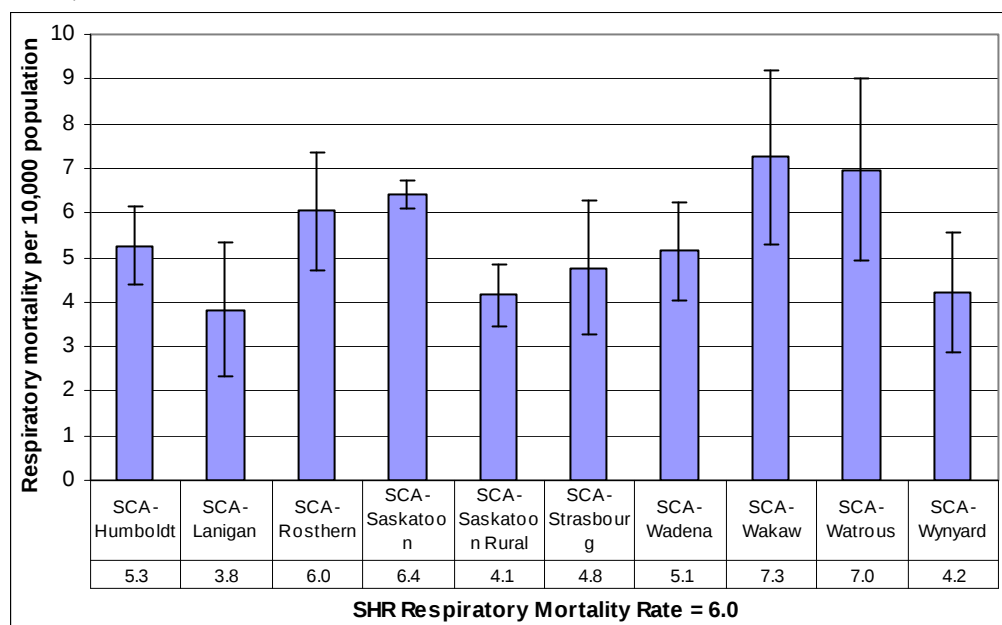
Respiratory death rates are highest in Saskatoon compared to rural SHR as a whole (6.4 and 5.0 per 10,000 respectively). The differences here are statistically significant (see Table 7). CMA residents have statistically higher respiratory deaths than Weak MIZ residents, but not No MIZ (6.2 compared to 4.7 and 5.2 respectively per 10,000).

Our results are different than those reported nationally which find slightly higher respiratory death rates in rural. Part of the explanation may be the higher smoking rates in urban Saskatoon contributing to higher respiratory related conditions. Air quality may also be an influence, though air quality measures taken in Saskatoon are generally good to excellent. It is not known at this time what outdoor air quality is like in rural SHR, and more investigation may be needed.

Public Health Service Areas

Analysis of respiratory mortality by Public Health Service areas is shown in Figure 24. No geographies have significantly higher differences than the SHR average rate of 6.0 per 10,000 (95% CI: 5.8 – 6.2). Saskatoon rural, Lanigan and Wynyard all had a statistically significant lower respiratory mortality rates than the SHR total.

Figure 24: Respiratory mortality rate age-sex standardized, Public Health Service areas, 1995-2006



Source: Saskatchewan Ministry of Health, Vital Statistics.

vi) Motor Vehicle Collision mortality

Saskatoon compared to rural SHR and MIZs

Residents of rural SHR had over twice the motor vehicle collision mortality rates than Saskatoon residents (1.7 compared to 0.8 per 10,000 respectively). These differences were statistically significant as seen in Table 7. Similarly, residents of the three rural MIZ areas had twice the mortality rates from motor vehicle collisions than CMA residents (1.8 compared to 0.9 per 10,000 respectively). No analysis was done for Public Health Service Areas because of low case numbers.

vii) Suicide

Saskatoon compared to rural SHR and MIZs

There was no difference in suicide mortality rates between Saskatoon (1.1 per 10,000) and rural SHR (1.0 per 10,000). Similarly, the CMA area was virtually the same as the three rural MIZs in suicide mortality rates (1.1 and 1.0 per 10,000 respectively). Public Health Service Areas were not analysed because of low case numbers.

SUMMARY:

Mortality by cause did not show that rural residents were any worse off than Saskatoon residents. Only injury (including motor vehicle collisions) and heart disease showed elevated rates in rural areas. All-cause and respiratory mortality rates were significantly lower outside Saskatoon. The Rosthern area showed higher all-cause and injury mortality, and the Wadena and Humboldt areas showed higher heart disease mortality than the SHR averages. In almost all causes of death, residents of the CMA communities, had lower mortality rates than the SHR average.

b) Hospitalizations

Hospitalizations refers to discharges from a hospital, which means the patient either dies, is transferred to a new institution, or goes back home in the community. There are three hospitals in Saskatoon and seven in rural SHR, including Rosthern, Wakaw, Humboldt, Wadena, Wynyard, Lanigan, and Watrous (see Appendix D for a complete listing of all health facilities in rural SHR). All figures in this analysis are based on total number of discharges, not total number of people. For example, one person could be discharged from a hospital four times in a year and this would show as four discharges.

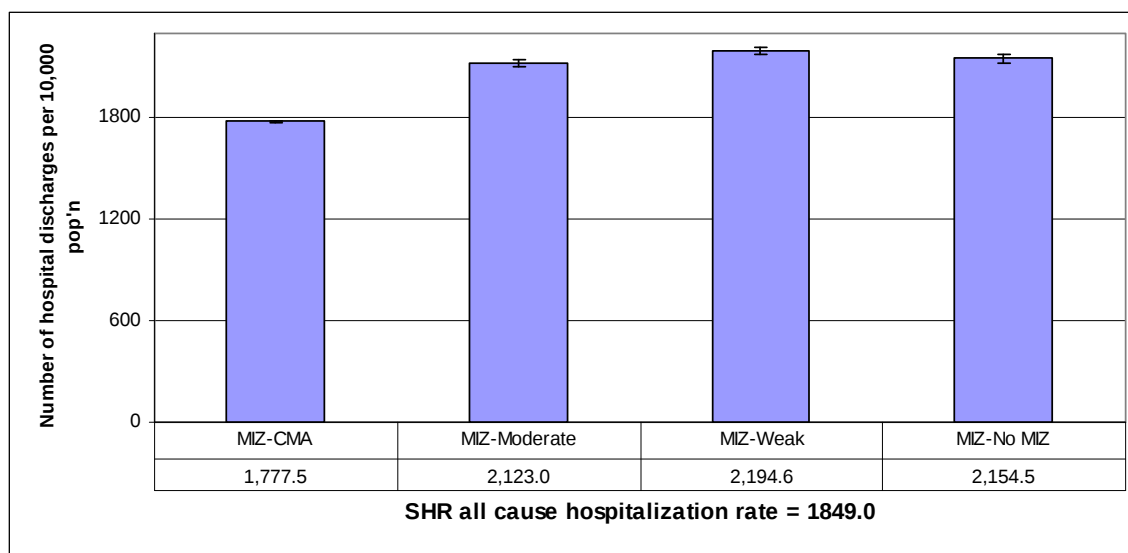
Saskatoon compared to rural SHR

Saskatoon residents had a much lower all-cause hospital discharge rate than rural residents (1,784.9 per 10,000 compared to 2,012.1 per 10,000).

MIZ

Figure 25 displays the hospital discharge rates by MIZ area. The CMA had a significantly lower rate of hospital discharges (1777.5 per 10,000 population) than any of the other MIZ areas. Females had much higher discharge rates than males, owing largely to the effect of pregnancy.

Figure 25: Age-sex standardized all-cause hospital discharge rate, MIZ, 1995/96-2005/06 combined

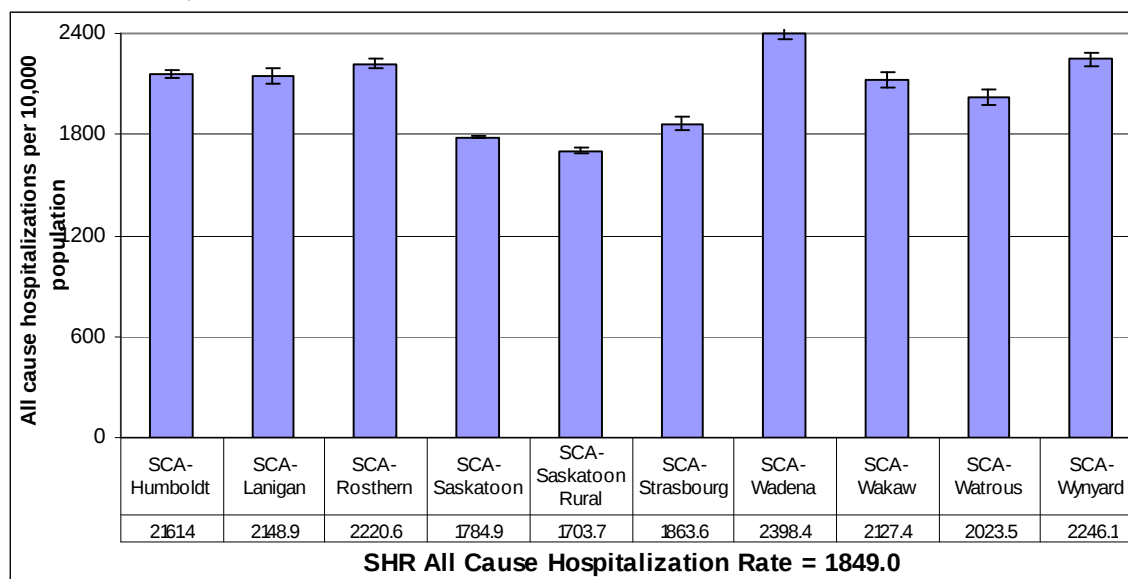


Source: Saskatchewan Ministry of Health, 2006.

Public Health Service Areas

Figure 26 displays hospital discharge rates by Public Health Service area, and a similar theme is identified whereby each rural area had higher hospitalization rates than the SHR average of 1,849.0 per 10,000 (95% CI: 1844.3-1853.7).

Figure 26: Age-sex standardized all-cause hospital discharge rate, Public Health Service Areas, 1995-2005 combined



Source: Saskatchewan Ministry of Health, 2006.

One explanation for the higher rates of hospitalizations in rural areas is that there is less access to physician services or clinics for assessment or minor treatment. The extent of services on an outpatient basis or through home care is likely limited in rural as compared to urban. This lack of care may drive up hospital utilization because residents have limited access to health practitioners (Elnitsky et al., 2007). Additionally, bed availability in hospitals in rural areas may be higher than in Saskatoon hospitals, which makes it more feasible to admit in rural areas. This issue of more bed availability in rural areas compared to urban areas was also found in a recent study completed in Quebec (Pampalon et al., 2006b). Nationally, instances of higher hospital utilization figures outside of metropolitan areas are seen (Canadian Institute for Health Information, 2008).

SUMMARY:

Hospitalization rates in rural SHR are higher than urban. This could be related to a variety of factors, and are wholly consistent with national findings.

V. Access to Health Care Services

Access to health care services is seen as a major issue for rural residents in SHR (SHR, 2007). Indeed, long travel distances to reach medical facilities and health personnel for rural residents has been highlighted elsewhere (Jennissen, 1992). One method used to measure access to health services is to examine the number of physicians practicing in rural areas compared to urban. How important access to physician and health practitioner services is to population health outcomes is debatable, but it is certainly an issue for rural residents who want to know that there are medical services available should they need it.

General Practitioners

Data from SHR showed that there are a total of 781 physicians practicing in the region, 265 of these being General Practitioners (GPs). Over 35 GPs practice in rural areas outside Saskatoon, equating to 46 per 100,000 population. Almost 230 GPs practice in Saskatoon, working out to 107 per 100,000, over twice as much as rural. This inequity in the distribution of rural physicians has been noted in other countries and in other jurisdictions in Canada (Rourke, 2008; Pong & Pitbaldo, 2005).

Note that these numbers are not adjusted to account for full time equivalents. This is a potentially important point because some physicians only work part time. As well, some City of Saskatoon physicians provide half day or full day clinics in rural areas of SHR.

Nurse Practitioners

To help counter the lower proportion of rural based GPs, 6 of the 13 full time equivalent Nurse Practitioners practice in rural SHR.

VI. Communicable Disease

a) Communicable disease rates

Communicable diseases, including enteric and blood borne disease, were examined to see if there was any difference in rates between urban and rural SHR. People residing in rural areas can be at higher exposure than urban residents for diseases such as West Nile virus because they may be outside more than urban dwellers. Enteric diseases are caused by bacteria, viruses, and parasites that can contaminate food and water and can have potentially serious acute health effects.

A set of infectious diseases were analysed over the period 1995 to 2007 combined for SHR and examined at the level of Saskatoon and rural SHR. Table 7 shows the crude rates for these disease types, with their 95% confidence intervals. As shown, Campylobacteriosis, Cryptosporidiosis, West Nile virus, and Aeromonas were higher statistically in rural SHR compared to Saskatoon.

Most of the cases of Campylobacteriosis occurred in the eastern portion of SHR, close to Wynyard. A poultry processing plant could be a contributing factor in why we see such elevated enteric disease rates in this area. The number of Aeromonas cases need to be interpreted with caution because it is not known from the literature how causal Aeromonas is to an enteric case.

Outbreaks of West Nile virus occurred in both 2003 and 2007. Rates of West Nile virus were higher in rural areas than urban both times. The higher rural rates are possibly due to rural resident's greater exposure to mosquitoes. The *Culex Tarsalis* mosquito habitat is more concentrated in rural areas, and mosquito control programs may not be as effective in smaller rural communities as they are in urban areas like Saskatoon. Most other communicable diseases examined had no difference between urban and rural.

Table 7: Communicable disease rates, SHR, 1995-2007

	City of Saskatoon Cases	Crude Rate per 10,000 population (95% CI)	Rural Cases	Crude Rate per 10,000 population (95% CI)
Campylobacteriosis	543	2.0 (1.8-2.2)	404	4.0 (3.6-4.4)
Cryptosporidiosis	201	0.7 (0.6-0.8)	105	1.1 (0.9-1.3)
West Nile Virus	253	0.9 (0.8-1.1)	174	1.7 (1.5-2.0)
Aeromonas	108	0.4 (0.3-0.5)	238	2.4 (2.1-2.7)
Salmonellosis	326	1.2 (1.1-1.3)	142	1.4 (1.2-1.6)
Giardiasis	451	1.7 (1.5-1.9)	146	1.5 (1.3-1.7)
Hepatitis C	5853	21.7 (21.1-22.3)	1745	17.5 (16.7-18.3)
E Coli	99	0.4 (0.3-0.5)	51	0.5 (0.4-0.6)

Source: Disease Control, SHR, 2007.

SUMMARY:

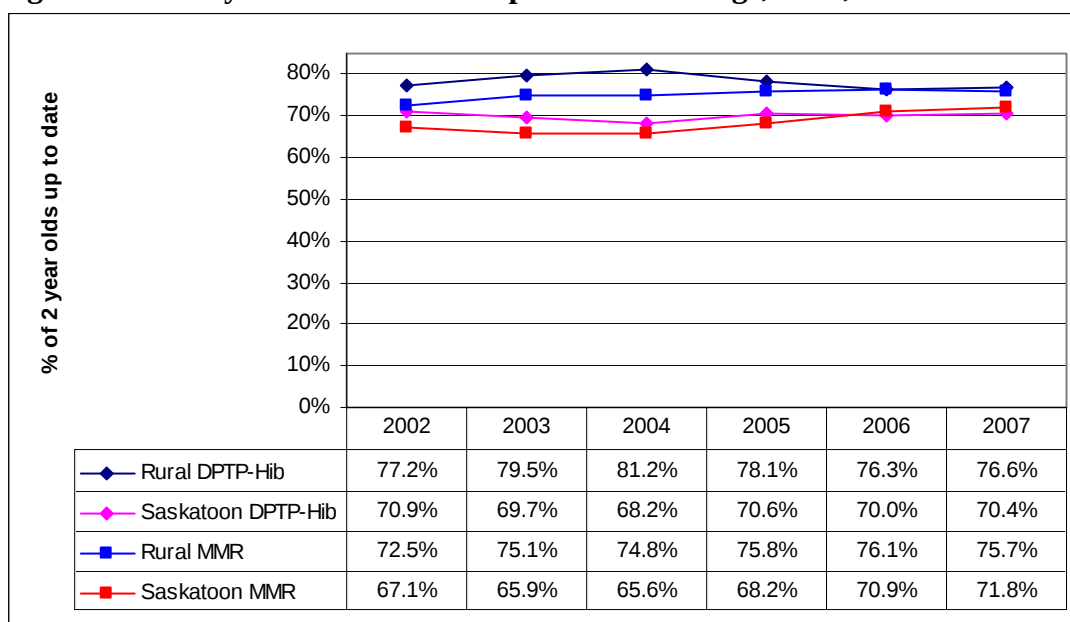
Certain water and food related enteric disease rates are higher in rural SHR compared to urban. More research could be done to uncover the causes of these increased rates. West Nile Virus continues to be a problem in rural areas.

b) Immunization coverage rates

The percent of the population that is up-to-date for their immunizations is a well known public health status indicator. Immunization is one of the most cost effective means of preventing infectious disease. Two year old immunization coverage is a standard indicator of preschool child health. A child is considered up-to-date if they have four doses of Diphtheria, Tetanus, Polio, Pertussis, and Haemophilus Influenza B (DPT-P-Hib) by age two. In addition, a child is considered up-to-date if they have two doses of the Measles, Mumps, and Rubella (MMR) by age two.

Analysis was done for Saskatoon and rural SHR. Rural means anything outside Saskatoon, including Post Office boxes (which do not mean a rural residence necessarily). Figure 27 shows that for the past 5 years, coverage rates have been higher in rural compared to Saskatoon for both DPT-P-Hib and MMR. SHR still falls short of the national target for 2 year old coverage, which is 97% for Rubella and 95% for Pertussis (Public Health Agency of Canada, 2007).

Previous analyses by Public Health Service area showed that Saskatoon, Rosthern and Watrous were geographic areas which had the lowest immunization coverage rates (Public Health Services, 2006).

Figure 27: Two year immunization up-to-date coverage, SHR, 2002-2007

Source: Saskatchewan Immunization Management System, 2008.

SUMMARY:

Immunization coverage rates for rural residents are higher than for urban SHR residents. Some gaps still remain in rural, and overall, more efforts are needed to bring our coverage rates up to national standards.

c) Sexually Transmitted Infections

Sexually transmitted infections (STI) are increasingly prevalent in SHR especially in young adults. They are infections caused by bacteria that can cause infertility in women or sterility in men if not treated. Two of the most common STIs in SHR are chlamydia trachomatis and gonorrhea. Data for these indicators was only available with Saskatoon and rural SHR being anything outside the City of Saskatoon including Post Office Boxes.

The crude rates for both infections for Saskatoon and rural SHR for 2007 are shown in Table 8 below. Rural residents had less than half the Chlamydia crude rate compared to Saskatoon residents (181.3 compared to 464.9). For Gonorrhea, Saskatoon rates were almost four times higher than for rural residents (97.4 compared to 25.7).

Table 8: Chlamydia and Gonorrhea crude rates per 100,000, 2007

	Chlamydia	Gonorrhea
SHR	401.6	80.0
Saskatoon	464.9	97.4
Rural SHR	181.3	25.7

Source: Sexual Health program, SHR, 2007.

Urban SHR rates are higher than rural SHR likely due to the fact that STIs affect young persons, with high population density and low socio-economic status (Elliott et al., 2002). These factors are more reflective of the urban Saskatoon population, especially in and around the core neighbourhoods, than rural SHR, where young persons make up a lower percentage of the population than urban.

SUMMARY:

STI rates are much lower for residents living in rural SHR.

Discussion and Implications

This report is the first rural population health status report developed in Saskatoon Health Region. During the 2007-2010 strategic planning consultation sessions, stakeholders within rural SHR were concerned about access to care in rural areas and overall rural health issues (Saskatoon Health Region, 2007). This report is the first step in attempting to shine a light on the health status of rural individuals in our region.

The biggest finding from our report is that, generally speaking, rural residents in SHR fared well compared to urban residents in or near Saskatoon. In some of the well-used public health measures of infant mortality, life expectancy, low birth weight and all-cause mortality, rural residents fared at least as well if not better than urban residents. We have found only one article that substantiates our findings of better pregnancy related outcomes for rural residents (Fallis et al., 1985). This is contrary to most Canadian literature we found that suggested that there were vast disparities in rural health compared to urban.

For example, the Romanow Report (2002), using data from Statistics Canada and the Canadian Institute for Health Information, showed that life expectancy, infant mortality, total mortality and injury-related deaths for people in predominantly rural regions was higher than for those living in predominantly urban areas. The Kirby Panel Report (2002) proclaimed that the health of rural residents is worse than their urban counterparts in Canada. Pitbaldo et al. (2004) did analysis on 172 health indicators and found the health status in rural areas worse than in urban areas for 64% of the indicators. Finally, DesMeules and Pong (2006) reported that while some health measures did not show any pronounced differences, rural areas generally showed a health disadvantage for the health measures used in that study.

We cannot say for certain why our rural residents fared relatively better compared to rural Canadians. One clue could be regional differences in death rates. For example, DesMeules & Pong (2006) reported that mortality rates in general are lowest in western Canada compared to eastern Canada and the territories have the highest. This type of variation across Canada was something that could have made an impact on rural-urban comparisons of mortality and other health outcomes, especially considering communities in the north are rural. This type of variation in health outcomes is not present in our

analysis because some of our rural residents are only 30 minutes away from a metropolitan centre. We are but one health region in one province, so our variation is going to be much smaller than when compared with Canada.

Another clue as to why our rural residents fared relatively well could be income and its strong relation to health. In Canada, there is about a 3% difference between urban and rural incidence of LICO, meaning that there wasn't much difference in income distribution. In SHR, however, urban LICO was higher in Saskatoon compared to rural (18% vs. 11%), so that rural residents may be protected when comparing health indicators against urban residents.

To further add to our look at rural poverty, we used the deprivation index developed by Pampalon et al. (2006) to get a visual look at poverty in our region. What the index showed is that around all of the First Nation's reserves, and in certain pockets in the northern and eastern parts of our region, there are many poor communities. Because the populations in these areas are relatively low, providing needed services is a challenge. Analysis into health outcomes of rural deprived residents compared to rural affluent residents is another avenue for future research.

We did find, similar to other pan-Canadian reports (Mitura & Bollman, 2003; DesMeules & Pong, 2006), that health behaviours were less than ideal in rural SHR. For example, leisure time physical activity rates and vegetable and fruit consumption are significantly worse statistically in rural compared to CMA residents. The greater distances to get anywhere in rural make travelling by car a necessity and limit the use of more active modes of transport. Ideas from rural residents about how to incorporate physical activity into their day is important. In terms of healthy eating, vegetable and fruit costs are higher in rural SHR and access is likely limited compounding the ability of rural residents to get adequate amounts of fruits and vegetables in their diet.

The one behaviour where rural residents fared better than those in the urban CMA, was in current smoking rates. This is counter to results shown in Quebec (Pampalon et al., 2006b) and nationally (DesMeules & Pong, 2006). Senior population distribution is higher in rural, which may help explain this phenomenon, but is an area that may need further investigation.

The reader is cautioned about the analysis of the CCHS data because variance estimations have not been completed according to Statistics Canada's recommendations. The results have also not been age standardized so that the impact of the higher senior population was not adjusted for in our analysis.

From the many different ways we could have divided up our rural areas, we chose three primarily. We defined rural first as anything outside the boundaries of the City of Saskatoon. We also used the Rural and Small Town definition of rural which names Metropolitan Influence Zones (MIZ) based on commuting distance to a CA or CMA. The Rural and Small Town definition is one recommended by Statistics Canada and is being

increasingly used. Finally, we used Public Health Service Areas to help identify smaller geographical areas that might be of use for health planning purposes.

Our main data sources were all commonly accessible administrative data sets and surveys. We were somewhat limited in the types of analysis that we could do because of small sample sizes in rural SHR. For example, the CCHS data was only analyzable with a city–rural dichotomy, because the small sample sizes increased the sampling variability to levels that were too high to report. Income, education, and employment data was somewhat limited from the census because of small populations in many rural SHR communities.

Our analysis approach was descriptive, similar to other health status type reports. However, there are limited inferences one can make based solely on descriptive statistics. Further multivariate analysis could be run for example on smoking rates in rural versus urban to understand what factors most clearly affect this outcome. We hope this report to be an initial starting point for those wanting to do further research in rural health.

We also did not have quality of life data or community asset mapping information that would highlight the positives in health instead of reporting primarily disease and death related information. Work is being done on this in SHR through the Rural Early Years Coalition and may provide a framework to include more positive related health statistics.

All areas have been seeing an increase in Registered Indian Status (RIS) populations in recent years. In Saskatoon, over 14,000 residents were RIS, compared to just over 3,500 in rural SHR in 2008. Compare this to 9,200 and 2,600 respectively in 1995. Most of the increases in RIS occurred in the Moderate MIZ area, which contains two of the four First Nations Reserves in SHR.

Aboriginal health status is generally assumed to be much worse than non-Aboriginals as evidenced by lower life expectancies, higher rates of chronic diseases like diabetes, higher rates of infectious disease like tuberculosis and higher youth suicide rates (Health Canada, 2004). Because of the unique health status of Aboriginal peoples, rural services, on or off reserves, will need to be specially tailored to this sub-group.

Access to physicians may not be highly correlated with population health status, but it is an area that rural residents are understandably concerned about. Our results showed that physician access is better in urban areas than rural in SHR, however nurse practitioner access in rural is higher than for Saskatoon. The rural health strategy may help to better identify what can be done about this issue.

Certain enteric disease rates continue to be a concern in the south eastern parts of SHR and this could again be cause for further analysis or investigation. West Nile virus continues to infect proportionally greater numbers of rural SHR residents compared to urban, and further research into the causes and risk factors associated with these cases is ongoing. Immunization coverage rates are generally better in rural areas than the City of

Saskatoon, but there are pockets where more efforts are needed. Favourable lower STI rates are also seen in rural SHR.

The implications of these results will be examined in the coming months as SHR develops a rural health strategy. It is hoped that these results will be useful for this strategy and that where there are deficiencies in rural health status, interventions will be initiated.

This report contains a large compilation of up-to-date data for rural SHR. As a whole, rural SHR residents perform at least as well as urban residents in a number of health indicators. Rural places, in SHR at least, are not as negative to health status as is stated in other Canadian reports.

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Appendix A Statistical Analysis and Limitations

This report uses descriptive statistics to assess health status. Crude rates and simple percentages and means are the basis for descriptive statistics. The problem with relying solely on these rates, percentages and means, is that any differences found between population groups may simply reflect their underlying age and sex profile rather than the likelihoods of death, illness or other health behaviours. For example, because the risk of death is related to age, comparisons of crude mortality rates between rural and urban areas could be misleading because of the younger demographic in urban areas (Australian Institute of Health and Welfare, 2005). Age standardizing rates takes into account such underlying demographic differences. When appropriate, we have used age standardized rates using the direct method.

All measures include, where appropriate, 95% confidence intervals to assess statistically significant differences between groups.

Data Sources

Many different data sources were used for the production of this report. A summary of each of the sources follows.

Covered Population

All population data comes from the provincial Ministry of Health in their covered population databases. The covered population is a count of all persons who held Saskatchewan Ministry of Health coverage on June 30th in each year. The Covered Population is not a census since it only counts persons who are registered for provincial health coverage and not every person who may have been a resident in Saskatchewan on June 30th. Health cards are renewed every three years so that in the intervening years, population estimates have tended to overestimate the population. This is because many residents of Saskatchewan can move out of province and not terminate their health coverage.

All residents of Saskatchewan are included except: (a) members of the Canadian Armed Forces, members of the Royal Canadian Mounted Police, and inmates of federal prisons, all of whom are covered by the federal government; and (b) people not yet meeting the residency requirement (coverage begins on the first day of the third calendar month following their move to Saskatchewan). Saskatchewan residents moving elsewhere remain eligible for coverage for the same period, and anyone whose coverage extends through June (i.e. who left the province April 1st or later) is included in the covered population. In the case of death, people who had coverage any time in June are included (Saskatchewan Ministry of Health, 2007).

The boundaries of rural municipalities (RM) and regional health authorities are not coterminous. This means that rural municipality populations get apportioned across health regions instead of being assigned to a specific health region, as is done with cities, towns and villages. The RMs population is split between health regions in proportion to the land area. For example, because 22% of the land area in the rural municipality of

Harris falls within SHR boundaries, so too does 22% of the population along with birth, death, and hospital separations get apportioned to Saskatoon Health Region. The other 78% of the RM of Harris is apportioned to Heartland Health Region.

Aboriginal Status

Registered Indian Status is a flag within the Covered Population database and the only ethnic identifier available. A person of Registered Indian Status means that the person is registered under Section 6 of *The Indian Act* and who has been assigned a ten digit number in the Indian Registry (Saskatchewan Ministry of Health, 2007). Using only Registered Indian Status is an underestimate of the total number of Aboriginals that live in SHR because it excludes those that have Aboriginal ancestry but are not registered through the Indian Act. It also does not include people of Métis or Inuit heritage and is a wholly different definition than that used by Statistics Canada in the census.

For Registered Indian Status residence, “Before 1998, all Registered Indian persons were included under the summary category “Reserves”, and the populations reported under the residence code of each band were based on Registered Indian status and band of origin. Beginning in 1998, Registered Indian persons have been reported on the basis of place of residence.” “Reserves” populations are now called First Nations and reflect the Ministry of Health’s best estimate of the Registered Indian population living on Saskatchewan reserves. “For each reserve, at least one postal code was identified as the reserve’s primary mailing address. Regardless of band of origin, any Registered Indian person using this postal code was counted in the population of the reserve identified with the same code. Records without a postal code default to the residence code recorded on the Person Registry System” (Saskatchewan Ministry of Health, 2007).

Population projections

Population projections were based on a method used by the Ministry of Health updated in 2007. This projection model uses populations from 2007, 2002, 1997, 1992 and 1987 to project to 2027. Plan 19 boundaries are used in this model. The original model provided population projections for regional health authority boundaries. We adapted this model by inputting our rural geographies into the model. As such, any errors due to small numbers in the rural geographies will be compounded when taking into account regional projections. A minimum population size of 3,000 is recommended for the model.

When projecting the population of 0-4 year olds, SHR specific fertility rates were used in the Ministry’s 2007 model. We used the SHR fertility rates for all rural geographies as this was suggested as a reasonable approach by the Ministry of Health (McRae, personal communication). As a check, we input the fertility rates for smaller rural geographies into the model and the changes were minimal.

The following changes were made in the Ministry of Health’s 2007 model when updating from the 2002 model.

1. Dropped the data from the 1970s and early 1980s,
2. Split out males and females, and

3. Did not fit the seniors to an S curve because the life expectancy improvements for these age groups seem to have stabilized.

The provincial projection model compares reasonably well with a Statistics Canada projection model from 2001 (Information Products Group, 2002). Whereby the Statistics Canada model was more upside down U shaped for the years 2006 to 2021, the provincial model was flatter. This could be because of the three year time span between when new health cards are issued.

Socio-economic status variables

2006 census data was used to calculate average personal income and low income cut offs (LICO) for the rural areas of SHR. All census sub-divisions had the same geographic boundaries as rural municipalities, villages and towns used by the Ministry of Health in their covered population. The census subdivisions were then geo-coded to the appropriate geographic boundary highlighted in the Methods section.

A couple of limitations are noted with this data source. First, we were not able to apportion census sub division values for income in the same way that we apportion populations to different health regions. For example, the rural municipality of Harris has 22% of its boundary within SHR but we received 100% of Harris' income and LICO values with the 2006 census. Second, any communities that have a population of less than 250 do not have income information included in the census. This is a standard Statistics Canada guideline and hence these communities were not included in the income and LICO values.

Material Deprivation Index

The material deprivation index combines education, employment and income data from the 2001 census to give a more comprehensive look at deprivation or poverty. It is based on work from Robert Pampalon and colleagues at the Institut Nationale Santé Publique du Québec (INSPQ). The index has been developed at the dissemination area (DA) level, the smallest geostatistical unit for which 2001 census data are produced. A DA includes a population usually between 400 and 700 people. Because some DA's did not have income values available, imputed values were used. In the prairie provinces, the population covered by the deprivation index was 97.6%.

The indicators used for the material deprivation index include:

- a) proportion of persons aged 15 and over who do not have a high school certificate or diploma,
- b) the employment/population ratio for persons aged 15 years and over, and
- c) the average income of persons aged 15 and over.

The Canadian Institute for Health Information provided the material deprivation scores from INSPQ for SHR by dissemination area.

Mortality data

Mortality data for the Saskatoon Health Region is provided by the Ministry of Health's Vital Statistics Branch. The deaths are those that occur to SHR residents using data from Saskatchewan Vital Statistics, Alberta Vital Statistics, and CIHI hospital separations for deaths occurring in all other provinces. Patient's place of residence is based on residence codes from the Ministry of Health for SHR (Scott, 2007). It therefore counts deaths based on where people live, rather than where people died. ICD-9 codes are used for all deaths before calendar year 2000 and after this date ICD-10 codes are used. There are limitations in trending between ICD-9 and ICD-10 codes as the conversion between the two for some causes are not comparable.

Hospitalization data

Hospitalization data for SHR is provided by the Ministry of Health's Population Health Branch. The data include all acute care and psychiatric inpatient hospitalizations for SHR residents, it therefore counts hospitalizations whether inside SHR boundaries or not. ICD-9 codes are used for all hospital separations prior to 2000/01 fiscal year, and ICD-10 are used after this date.

Age-sex standardized rates were calculated for mortality (see above) and hospitalizations, using the direct method and using the Canadian population from the 1991 census as standard. Age adjusted confidence intervals were calculated according to methods outlined in previous literature (Keyfitz, 1966; Chiang, 1961).

Life expectancy

Life expectancy calculations were derived from the Association of Public Health Epidemiologists of Ontario (2006). The abridged life table calculates life expectancy based on Chiang (1984), adapted for local area use (Manuel, 1998). Mortality data for five years (2002-2006) was used as the numerator. In some cases, the number of deaths was 0 over all 5 years. We imputed an average value of 0.2 (1 death divided by 5 years) for each age group where a 0 occurred.

Covered population data from 2004 was used as the denominator to calculate age specific life expectancy for different rural areas. Life expectancies were calculated only for those geographies that contained populations of 5,000 or more based on Toson et al., (2003).

Canadian Community Health Survey

The Canadian Community Health Survey currently has three cycles, 1.1, 2.1 and 3.1 for the years 2000/01, 2003, and 2005 respectively. Because of the small sample in any one cycle, about 1,200 for Saskatoon Health Region, it was necessary to merge these three cycles to provide a larger sample in which to analyze rural SHR populations. Pooling CCHS cycles has been performed before by Statistics Canada and methods are published (Thomas, 2006). This type of analysis requires that questions asked are the same, and the regional boundaries are similar amongst other issues.

Sample size for each CCHS cycle, Saskatoon, rural SHR and MIZ areas, 2001-2005

Geographies	N (% of total sample)	CCHS 1.1	CCHS 2.1	CCHS 3.1
Saskatoon	2,571 (70.2%)	778	905	888
Rural	1,091 (29.8%)	427	309	355
Total	3,662	1,205	1,214	1,243
CMA	2,994 (81.8%)	957	1013	1024
Moderate MIZ	227 (6.2%)	115	50	62
Weak MIZ	302 (8.2%)	97	91	114
No MIZ	139 (3.8%)	36	60	43
Total	3,662	1,205	1,214	1,243

Source: Statistics Canada, 2005.

The main challenge in analyzing CCHS merged data has been properly estimating the variance associated with each estimate. Because the CCHS uses a complex sample design, variance estimation techniques that incorporate this design are needed (i.e. it is not a simple random sample). Statistics Canada recommends using a replication method called Bootstrapping which estimates the variance 500 times and then takes the average to produce a final variance figure. This figure is then used to calculate the 95% confidence intervals. We obtained the bootstrap weights as of May, 2008, but the analysis has not incorporated this method due to software constraints. Statistics Canada cautions that any results using a method other than bootstrapping should not be published.

As a work around, another method for estimating variance is using the design effect and is an alternative suggested by Statistics Canada (Thomas, personal communication). The design effect measures how far from a simple random sample the survey is. A formula for estimating the variance was used that incorporated the average design effect for each of the three CCHS cycles (Lohr, 1999). The method uses unweighted values, whereas for our analysis, we needed to use weighted values to represent the SHR population. Therefore, when the estimate is published it is based on the weighted values, but the variance estimation uses unweighted figures.

Communicable Disease data

Certain communicable diseases are reported to Disease Control in SHRs Public Health Services. Enteric (gastrointestinal), blood borne and emerging disease numbers are compiled annually and are valid up to December 31, 2007.

Immunization Coverage data

Immunization coverage rate data was obtained through the Saskatchewan Immunization Management System (SIMS). Data contained in this report was obtained for the calendar years 2002 to 2007. Rural areas and those with post office boxes were grouped together which may not entirely reflect rural residence, since people living in the City of Saskatoon could have a post office box. Some data did not have any address information listed, and these data were excluded from our analysis.

Physician and other health practitioner data

All physician counts come from SHRs Medical Affairs office. They include both General Practitioners and Specialists that are licensed with the College of Physician and Surgeons and have hospital privileges. They do not include interns or residents and are based on head counts only and are not adjusted for full time equivalents. Physician count numbers are valid as of January 31, 2008.

Nurse practitioner full time equivalent numbers were obtained from the Manager of Primary Health with SHR.

Data Limitations

Any analysis focused on comparing health status of residents in different geographies is limited as we do not know how long residents have lived in certain areas. There is no way to tell from our data how long rural residents have actually lived in rural, therefore any health impacts from living in rural may be confounded.

The covered population accounts only for where people prefer to receive their mail, so that if someone lives on a farm in an RM, but elects to receive their mail in a town or village, they will be coded as a resident of the town or village. The Ministry of Health cannot at this time provide estimates as to how large of an issue this is.

The bulk of the analysis is bivariate, so there is no in-depth examination of how related risk factors may explain some of the findings. Further research may be required for those topic areas where the descriptive analysis suggests importance.

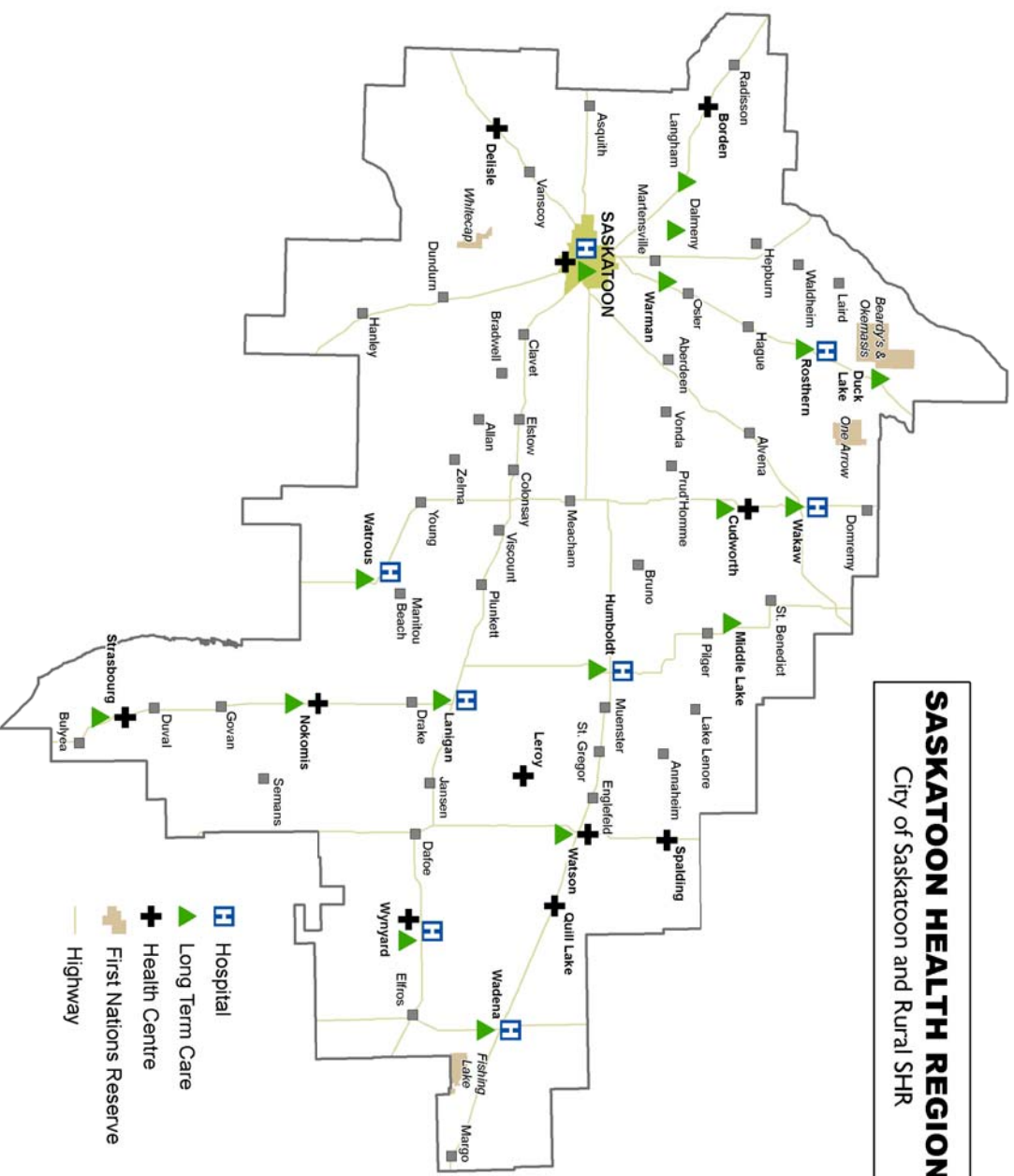
All hospitalization statistics are based on number of discharges, not number of people, so one person could potentially visit a hospital more than one time. Therefore, hospital discharge statistics may not truly reflect the burden of disease in the entire population. As well, a rural resident may be admitted in one of the rural hospitals, but be transferred to a City of Saskatoon hospital. This would count as two discharges, even though it is for the same event.

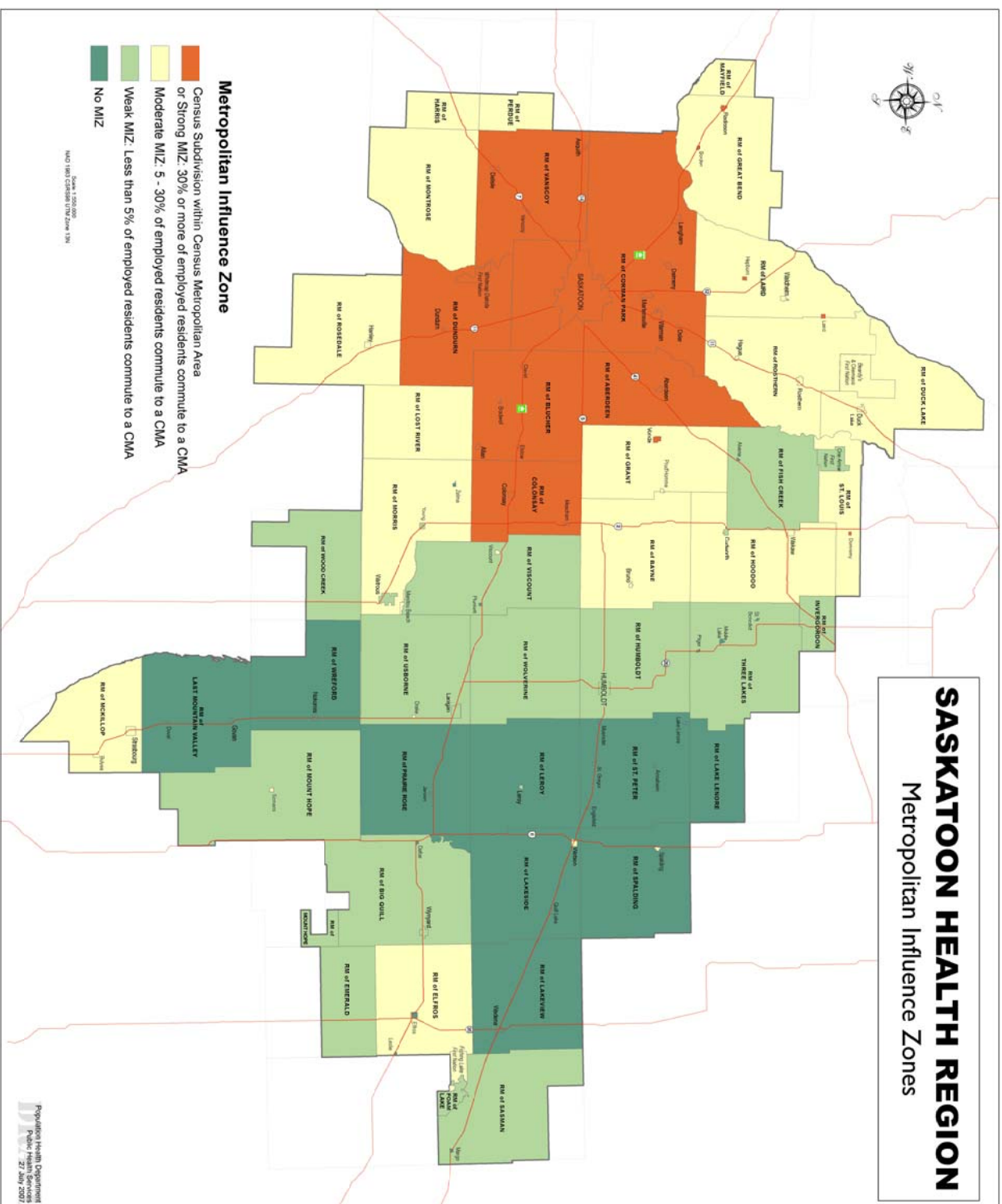
Most of the health outcome data is based on mortality and hospital separations, so that it only measures people's contact with the health system. We did not have physician visit or prescription drug data, nor were other health professional data sets available to us, so any health outcome analysis contained here is limited in scope.

Income data from census is somewhat limited in rural SHR as the data is only released for communities that have more than 250 people. At this point we have not done any work linking the deprivation index to actual health outcomes to see how these might vary.

No qualitative data sources were utilized, however we have incorporated feedback from groups that we consulted where possible. We have also reviewed the rural stakeholder sessions that were completed in 2006 for the strategic plan so we feel that the issues raised in those discussions are at least partially addressed in this report.

Appendix B Maps of geographies









Appendix C List of communities in each geography

List of communities in each MIZ group

CMA		Moderate MIZ		Weak MIZ		No MIZ	
Name	Rescode number	Name	Rescode number	Name	Rescode number	Name	Rescode number
Aberdeen	37330	Beardy's & Okemasis First Nation	76182	Cudworth	40131	Alvena	40250
Allan	34330	Bruno	37130	Humboldt	37020	Annaheim	36950
Asquith	34530	Bulyea	22050	Lanigan	31030	Dafoe	30852
Borden	40550	Drake	31051	Leroy	33930	Duval	25052
Bradwell	34352	Duck Lake	46330	One Arrow First Nation	76082	Elfros	30750
Clavet	34350	Fishing Lake First Nation	78684	RM Big Quill	30810	Englefeld	36951
Colonsay	34230	Hague	40331	RM Emerald	27710	Govan	25030
Dalmeny	34433	Hanley	28330	RM Fish Creek	40210	Jansen	30952
Delisle	34531	Manitou Beach	31251	RM Foam Lake	27610	Lake Lenore	36952
Dundurn	31430	Prud'Homme	37251	RM Humboldt	37010	Margo	33652
Elstow	34355	RM Bayne	37110	RM Invergordon	43010	Middle Lake	40050
Hepburn	40450	RM Duck Lake	46310	RM Mount Hope	27910	Muenster	36953
Laird	40451	RM Elfros	30710	RM Sasman	33610	Nokomis	28030
Langham	34430	RM Grant	37210	RM Three Lakes	40010	Pilger	40052
Martensville	34431	RM Great Bend	40510	RM Usborne	31010	Plunkett	34151
Meacham	34253	RM Harris	31610	RM Viscount	34110	Quill Lake	33850
Osler	34434	RM Hoodoo	40110	RM Wolverine	34010	RM Lake Lenore	39910
Radisson	40530	RM Laird	40410	RM Wood Creek	28110	RM Lakeside	33810
RM Aberdeen	37310	RM Lost River	31310	Watrous	31230	RM Lakeview	33710
RM Blucher	34310	RM Mayfield	40610	Wynyard	30830	RM Last Mountain Valley	25010
RM Colonsay	34210	RM McKillop	22010	Young	31255	RM LeRoy	33910
RM Corman Park	34410	RM Montrose	31510			RM Prairie Rose	30910
RM Dundurn	31410	RM Morris	31210			RM Spalding	36810
RM Vanscoy	34510	RM Perdue	34610			RM St. Peter	36910
Saskatoon	34424	RM Rosedale	28310			RM	28010

						Wreford	
Vanscoy	34554	RM Rosthern	40310			St. Benedict	40051
Vonda	37230	RM St. Louis	43110			St. Gregor	36954
Warman	34432	Rosthern	40330			Wadena	33730
Whitecap Dakota Sioux First Nation	75980	Semans	27952			Zelma	31257
		Spalding	36852				
		Strasbourg	22030				
		Viscount	34154				
		Wakaw	40130				
		Waldheim	40430				
		Watson	33830				

Appendix C

List of communities in each Public Health Service area.

Note that the City of Saskatoon is a public health service area with residence code 34424.

	Humboldt	Lanigan	Rosthern	Saskatoon Rural	Strasbourg	Wadena	Wakaw	Watrous	Wyward
Name	Rescode number	Name	Rescode number	Name	Rescode number	Name	Rescode number	Name	Rescode number
Annaheim	36950	Drake	Beardy's & Okemasis Duck Lake	Aberdeen	Bulyea	Englefeld	Alvena	Mantou Beach	Datœe
Bruno	37130	Jansen	Duck Lake	Allan	Duval	Fishing Lake First Nation	Prud'Homme	RM Morris	Eftros
Cudworth	40131	Lanigan	Hague	Asquith	Govan	Leroy	RM Fish Creek	RM Wood Creek	RM Big Quill
Humboldt	37020	Nokomis	Laird	Borden	RM Last Mountain Valley	Mango	RM Hoodoo	Watrous Creek	RM Eftros
Lake Lenore	36952	RM Prairie Rose	One Arrow First Nation	Bradwell	RM McKillop	Quill Lake	RM Invergordon	Young	RM Emerald
Middle Lake	40050	RM Usborne	RM Duck Lake	Clavet	RM Mount Hope	RM Lakeside	RM St. Louis	Zelma	RM Foam Lake
Muenster	36953		RM Laird	Colonsay	RM Wireford	RM Lakeview	Wakaw		Wynyard
Pilger	40052		RM Rosthern	Dalmeny	Semans	LeRoy			
Plunkett	34151		Rosthern	Delisle	Strasbourg	RM Sasman			
RM Bayne	37110		Waltheim	Dundurn		RM Spalding			
RM Humboldt	37010			Elstow		Spalding			
RM Lake Lenore	39910			Hanley		Wadena			
RM St. Peter	36910			Hepburn		Watson			
RM Three Lakes	40010			Langham					
RM Viscount	34110			Martensville					
RM Wolverine	34010			Meacham					
St. Benedict	40051			Oslter					
St. Gregor	36954			Radisson					
Viscount	34154			RM Aberdeen					
				RM Blucher					
				RM Colonsay					

Humboldt	Lanigan	Rosthern	Saskatoon Rural	Strasbourg	Wadena	Wakaw	Watrous	Wynyard
			RM Cornman Park 34410					
			RM Dundurn 31410					
			RM Grant 37210					
			RM Great Bend 40510					
			RM Harris 31610					
			RM Lost River 31310					
			RM Mayfield 40610					
			RM Montrose 31510					
			RM Perdue 34610					
			RM Rosedale 28310					
			RM Vanscoy 34510					
			Vanscoy 34554					
			Vonda 37230					
			Warman 34432					
			Whitecap Dakota Sioux First Nation 75980					

Appendix D List of rural health care facilities and services

As of December 31, 2007, the following were health care facilities and services located in rural Saskatoon Health Region (SHR, 2007b).

Hospitals	Community Health Centres	Long-term Care Facilities	Home Care	Ambulance
Lanigan	Borden Primary	Bethany Pioneer Village (Middle Lake)	Humboldt services Bruno, Cudworth, Leroy, Middle Lake, Quill Lake.	Lanigan and district
Rosthern	Cudworth Community	Central Park Lodge (Lanigan)	Lanigan services Nokomis, Strasbourg, Watrous	Strasbourg
Humboldt District	Delisle Primary	Cudworth Nursing Home (Cudworth)	Wakaw services Prud'homme	Wynyard
Wadena	Leroy Community	Dalmeny Spruce Manor (Dalmeny)	Rosthern	Humboldt
Wakaw	Nokomis	Golden Acres (Wynyard)	Spalding	Watson
Watrous	Quill Lake Community Health and Social Centre	Goodwill Manor (Duck Lake)	Vonda	Wadena
Wynyard	Spalding Community	Lakeview Pioneer Lodge (Wakaw)	Wadena	Rosthern
	Strasbourg and District	Langham Senior Citizen's Home (Langham)	Watson	Wakaw
	Watson Community	Last Mountain Pioneer Home (Strasbourg)	Wynyard	
	Wynyard Community	Manitou Lodge (Watrous)		
		Mennonite Nursing Home (Rosthern)		
		Nokomis Health Centre (Nokomis)		
		Pleasant View Care Home (Wadena)		
		Quill Plains Centennial Lodge (Watson)		
		St. Mary's Villa (Humboldt)		
		Warman Mennonite Special Care (Warman)		

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